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VOLUME XII.

HANDBOOK

OF THE PRACTICE OF

FORENSIC MEDICINE,

BASED UPON PERSONAL EXPERIENCE.

69898

BY

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VOL. I.

THANATOLOGICAL DIVISION.

TRANSLATED FROM THE THIRD EDITION OF THE ORIGINAL BY

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MDCCCLXI.

Non hypotheses condo, non opiniones vendit quod vidi, scripsi.

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AUTHOR'S PREFACE

TO THIRD EDITION.

THE rapid sale of the third edition of the "gerichtliche Leichenöffnungen," originally gave occasion to the publication of this work, the Thanatological Division of which, published first in October, 1856, and reprinted unaltered in December, 1857, may be regarded as but a new edition of the two former volumes; to this, in September, 1858, was added a Biological Division, also equal in bulk to both of the previous volumes. In a very few months it became evident that a new (third) and improved edition would be required, and in it the entire work is now for the first time offered to the public in a complete condition.*

In this book, as in all my public lectures for the last thirty-six years, I have specially striven against the prime failing of most authors on forensic medicine, viz., the separation of it from general medicine, and endeavoured to purify it from all irrelevant rubbish, which has been so copiously accumulated in it by tradition, want of experience in forensic matters, and therefore ignorance of the proper relation which the medical jurist bears to the judge, as well as mistaken ideas as to the practical object of the science. No doubt much has already been done in this respect by the advance of general learning in the course of by-gone ages. Questions, such as those we find treated of

* So great is the estimation in which this most valuable work is held, that it has not only been translated into French, Italian, Dutch, and now into English, but *a fourth edition* of the original is already called for; and the members of the New Sydenham Society lie under a deep debt of gratitude to Professor Casper for the very great kindness with which he undertook, *unasked*, the great trouble of revising each sheet of the present translation before it went to press, so as to bring it abreast of the very latest German edition, and ensure that, whatever may be its literary defects, it shall at least faithfully represent the meaning of the author.—TRANSL.

in the older writers—as, "Was Adam a hermaphrodite?" or, "Can a woman be got with child by the devil?" are certainly no longer to be met with; but the echoes of real sophistries, in which the *medicina forensis* was so rich, contemptibly-crafty "ifs" and "buts," are still to be found lingering even in writings of the most modern date. The correct appreciation of a single simple dogma, which is as unquestionably correct as it is to be unalterably maintained, leads of itself to the necessary reform in treating of juridical medicine. I mean the dogma that a medical jurist is—*a physician*—nothing more, nothing less, nothing else; and, as this simple dogma has been grossly misunderstood; to make it still more plain, I again repeat, he is *a physician*, and not *a lawyer*, &c. As a Technologist, artist, or any craftsman, &c., must hold his knowledge or experience in his art or trade at the service of justice in the interest of the common weal, so must the physician, and nothing else is required of him. What would be said, however, were a painter, summoned as an expert to give his opinion in a supposed case of fraudulent sale of a pretended Raphael, to proceed to lecture the court on the juridical meaning of the word "fraud," or on the "object of punishment," &c.?!

And yet, for many a day, nay, even yet the most recent text-books for medical experts contain the most exhaustive discussions upon the definitions, *dolus, culpa*, &c., matters which lie altogether beyond the province of medicine, with which the physician has nothing to do, least of all in his forensic capacity. This erroneous blending of medical and legal ideas and objects is also combined with another greater and more consequential error in the practice of forensic medicine. I mean the tendency to endeavour to obtain strict apodictical proof, such as was required by the practice of the older penal courts, founded upon the ancient theory of evidence in the science of penal law, with which juridical medicine has most unseemlily identified herself.

Apart, however, from the facts—that the modern science of penal law and the practice in criminal courts have relinquished this theory of strict proof,—that we have this strict proof replaced by the mental conviction of the Judge (or jury), attained by a consideration of all the ascertained facts in their entirety. Apart from all this, I demand in what other branch of general medical diagnosis, of which the forensic is but a part, is such indubitable certainty required, or where can it be attained? From this error arose that cursed scep-

ticism in so many medico-legal matters, which has risen to such a height as to lead in many questions to the complete negation of forensic medicine and of the forensic physician. Let me refer to the discussions regarding the proof of respiration (*docimasia pulmonaris*), regarding poisoning, doubtful homicide, &c. Whilst the physician, in making his diagnosis at the sick-bed, collects and carefully weighs all the facts of the case, not only those afforded by the *status præsens*, but also everything that can be learned regarding the previous state of health of the patient, and even his mode of life; shall the same physician in making his diagnosis as a judicial expert ignore the past, enchain that which he most needs to make his labours useful, his judgment, his sound understanding, his reasoning powers, and confine himself exclusively to the "proof" afforded by the natural object at the time of his examination?

Every medical jurist of actual experience will agree with me that, with such views no progress can be made in forensic matters, that in many cases, indeed, such as disputed mental conditions, disputed homicide, &c., it may be perfectly impossible to arrive at a convincing diagnosis, without the knowledge of such circumstances as actually belong to the *medical* consideration of the case, though they do not come before the physician at the time of his examination of it. But such men, whose testimony I appeal to, are but few, for from the nature of the circumstances the opportunity is but rarely afforded of gathering experience in the domain of forensic medicine, and of making personal observations in it on any great scale, it ought, therefore, not to be taken as a reproach when I state the fact that forensic medicine as represented in the medical periodicals and handbooks, particularly of Germany, has been for the most part treated of by men in whom solid scientific attainments, diligence in compilation, and book-learning could not compensate for the want of personal observation. I may name one deceased author who well deserves to be mentioned before all others on account of the extensive influence he so long enjoyed, I mean Henke, who, as a most diligent writer, has worked for forensic medicine as few others have done, without, so far as I know, ever having performed one judicial dissection, stepped across the threshold of any prison, examined any woman said to have been deflowered, investigated the doubtful mental condition of even one criminal, or of a single case of malingering, or ever having stood as an expert before any court. How many of his predecessors and successors have been and are in the

same or a similar position! Confined to their desk alone, the want of personal experience compels them to have recourse to previous writers, and to confirm, by "quotations" what could not otherwise be proved, a method of treatment formerly much indulged in, particularly in German literature, but rated at its proper value, now that medical science requires living experience and not mere compilation and book-learning. And this has proved another copious source whence many errors and erroneous dogmas have been introduced into juridical medicine! P. Zacchias (*Quæst.* Lib. I., Tit. II., Q. VIII.) not only proves by "quotations" the fact (!!) that 8, 9, 12, 36, 72, and 150 children have been born *uno enixu*; but he also "quotes" the case of a Countess Henneberg, who is stated to have given birth to 365 children at one time; to this, however, he cautiously adds: *ego judicium abstineo!* Science, indeed, no longer suffers from such absurd statements, but the no less nonsensical memoir, which probably few that quote it have read: *Lucina sine concubitu*, inaugural dissertations, one or two hundred years old, which no one in our century has read, and the like, are still quoted as "authorities" in the most recent handbooks of forensic medicine! The reader is not to suppose that I am now referring to a mere innocent and resultless parade of learning; he may convince himself of the reverse from my critique upon Ploucquet's lung test, from the treatise on sexual crimes, on protracted gestation, on "morbid propensities," &c., in which he will find most striking examples of errors of the utmost consequence which have crept into forensic medicine and become current there solely by means of quotations and their uncriticised employment.

Favoured by the possession during twenty years of a medico-legal appointment, affording very extensive practical opportunities, not only for personal observation in medico-legal matters, but also for collecting the experience of other medical men in their professional intercourse with courts of law, I have endeavoured in the production of this work to confine myself as far as possible to my own personal experience, making use of that of others as sparingly as possible, and that only from the most trustworthy sources, preferring openly to confess my own want of experience in any matter where it has been insufficient. Public criticism has confirmed my hope, expressed at the first appearance of this work, that something novel and peculiarly my own would be found not only in its general design, but also in many of its component chapters, as for instance, in those chapters

which treat of ability to gain a livelihood or to suffer imprisonment, of disputed sexual relations, of protracted gestation, of superfœtation, of the chronological succession of the phenomena of putrescence, of injuries, poisonings, and burns, of medical responsibility in regard to treatment, of my extended series of experiments upon the dead body, &c., and in the entire treatment of the psychological department. The latter in particular at its first appearance seemed to require some justification when contrasted with the mode in which this subject had been treated by professed alienistes and the authors of the text-books of Forensic Psychology, especially by some of them. In it I have intentionally avoided all purely speculative philosophical discussions, as well as all purely nosological or legal inquiries with which the tenor and the object of forensic medicine has no concern, and which only serve to increase the darkness and confusion of which practitioners seeking for instruction so constantly, and with right complain in regard to the usual mode of treating forensic psychonosology. I have seen, however, with much satisfaction, that my views regarding the treatment of this question, and the uselessness and hurtfulness of a too minute subdivision of mental affections for judicial purposes, are now in complete unison with those of the best of our modern alienistes, men of mature experience. It is a further peculiarity of this book, that I have omitted from it all purely surgical and physiological questions, for instance, all discussions regarding the mortality of injuries of the various organs, the doctrine (never heard of *in foro*) of the various ages of man's life, &c., because these are all questions of general medical science, and have, therefore, been long well known to the medical jurist. Forensic chemistry I have also excluded from the limits of this work, not only because there already exist so many excellent monographs upon this subject, but also, that I might shun the failing of most of the home and foreign handbooks, in which toxicology is permitted to occupy such an unseemly amount of space, as if questions belonging to it were those that most frequently occurred *in foro*, whilst they actually are relatively of but rare occurrence, and in their treatment, moreover, the medical jurist is both by law and custom allowed the assistance of a professed chemist.

In regard to one important item of the book, the collection of illustrative cases, I may remark, that in the first two editions, the Biological Division contained 195 cases, and the Thanatological 346. The present (third) edition has been in this respect materially en-

larged; since 26 new cases have been added to the Biological Division, and 64 to the Thanatological Division) exclusive of 25 cases incorporated with the text of the latter), many of these cases of the utmost importance. On the other hand, 10 of the previous cases of minor importance have been suppressed, so that now the entire work contains 221 judicial cases investigated during life, and 400 cases investigated after death. Most of these medico-legal dissections have been observed along with me by my pupils, among whom there are constantly many very able and highly-educated young physicians, and this fact I have a perfect right to adduce as additional security for the truthfulness of my illustrative cases.

In striving to give to this work the form of *a Clinical Treatise on Forensic Medicine,* I have carefully endeavoured in selecting all the cases to pay special attention to the specific interest possessed by each individual case in relation to the question under consideration. From the great number and manifold combinations in the cases, analogies will probably be found amongst them, bearing on the practical treatment of even the most difficult cases. To this end I would willingly have doubled the number of cases, if a regard to the size of the work had not set bounds to my wishes.

The text of this third edition has also received important additions, and this particularly in the Thanatological Division, almost every chapter of which has been altered. The materials for this have been contributed partly by my own continuous investigations and experiences, partly by a consideration of the views suggested by various authoritative reviewers of the former editions, which I have thankfully made use of, so far as they were consistent with my own convictions; partly, finally, by the additions to science, up to the going to press of each individual sheet of the work. Thus, special additions have been made to the observations upon the occurrence of spermatozoa, upon tattooing, on the relations between the size and weight of new-born children, and on the centre of ossification in their femoral epiphysis, and on the artificial post-mortem production of the mark of a strangulating ligature. The following chapters are partly new and remodelled, partly much enlarged; those upon viability, protracted gestation, mummification, the diagnosis of blood-stains and hæmin crystals, on gun-shot wounds, burns, poisonings, rupture of the coats of the carotid arteries (in persons hanged), the analysis of the blood after poisoning with carbonic oxide gas, on the prerespiratory movements of deglutition, the injuries to the fœtus *in*

utero, the hydrostatic test, &c. My treatment of the question of malapraxis has been much misunderstood. Nothing is easier than to attack every possible mode of viewing the matter. Amongst those critical attacks which were worth regarding, I have not been able to discover any positive opinion opposed to mine, for which, had it been anything tenable, I would have gladly exchanged my own. I have thankfully made use of a few hints received chiefly from writers on criminal law, and trust I shall have given occasion to fewer misunderstandings in my present treatment of the subject. In spite of careful weeding of the text, and great economy in printing, the additions to both volumes of this edition have amounted to more than six sheets, for which the publisher has not, however, raised the price.

Only the statutory definitions of the Prussian statute books are given *in extenso*, regard has, however, been had to the definitions of other statute books, particularly German ones. Since, however, the definitions of all the more recent statute books, particularly the Penal Codes, under the various heads with which we are concerned, are very similar to those in the Prussian statute books, it would be an unjust reproach to call this a handbook of "Prussian" forensic medicine, just as much as it would be to call the English and French text-books on the subject, treatises on English or French science, because they have special reference to the laws of their own country.

The attempt to give coloured representations of medico-legal objects to supplement the necessarily imperfect description, was a novelty; the reception which my Atlas, now increased by one plate, has received from the public, has proved that it has supplied a desideratum.

A similar idea may indeed be entertained of the whole Handbook, to judge from the rapid and extensive sale it has met with at home, and the numerous translations which have been made of it. I have endeavoured to prove my gratitude by the careful manner in which I have revised this third edition.

CASPER.

BERLIN, *April*, 1860.

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INTRODUCTION.

§ 1. Origin of the Word "obduction."

It is only within the last two centuries that the use of the word *obductio* has become general amongst practical and scientific men, the expressions formerly employed in the same sense having been *inspectio, sectio,* or *dissectio cadaveris.* In a former work,* I inquired how it happened that a Latin word signifying to veil, to conceal, to cloak, to obscure, or to cover (as with a curtain), had come to denote an operation having for its object the very reverse, viz., to open up and bring to light, and having since then been favoured with the views and explanations of several distinguished philologists on this point, I select from them the following, as being the most important:—

1. "According to Heyse's Dictionary of Foreign Words,† *obducere* was employed by the older Latins to signify to uncover, or open. *Nonius Marcellus de compendiosa doctrina per literas ad filium, Cap. iv.* (p. 246, in the edition of Gerlach and Roth), explains *obducere* by *aperire,* appealing for proof to the following sentence from *Lucilius,* XXIX., *vos interea lumen adferte atque aulæa obducite.* And should this be the correct explanation of this passage of Lucilius, the medico-legal signification which has become attached to the word *obductio* can no longer seem extraordinary."

2. My distinguished colleague in the University, Professor Boeckh, in opposition to this, thinks, on the authority of a passage

* Gerichtliche Leichenöffnungen. Erstes Hundert. Dritte Auflage. Berlin, 1853, s. 3.

† Fremdwörterbuch. 9 Auflage, s. 513.

in Plautus, that *obducere* was probably used at first only to signify the "bringing forward" or "production" of the dead body.

3. Another linguist says, "An appellation is derived either from some principal or accessory circumstance, and if we wish to trace its origin we must keep to the most usual signification of the word employed. For, so far as I know, it is never the rarer, but always the more common meanings of Greek or Latin words that are or have been made use of to express modern ideas. This view makes the signfication *offerre, afferre,* which Boeckh advocates as little probable as the *aperire* previously propounded, although, no doubt, *ob* in composition does convey the idea of towards or opposite to, as in *offerre.* The presence of the word *aulæa* in the quotation from Lucilius, makes it, moreover, but doubtful proof, for we know that the ancients said '*aulæum mittitur,*' the curtain rises;—and when we say 'the curtain falls,' they used the expression '*aulæum tollitur.*' And besides, the *aperire* of Nonnius may be but a misprint for *operire.* We must, therefore, hold fast to the more usual signification, "to veil." It would perhaps seem a little farfetched to call the principal circumstance, the examination of the body, 'a veiling or covering of it,' in opposition to '*aperire,*' a making plain or recognisable; but to this we may retort, that the obduction, when this is *a sectio* renders the body more or less unrecognisable—figuratively, veils it. A more probable explanation may, however, be found; but for this we must turn to the accessory circumstances, from which so often appellations are derived, particularly in euphemistic expressions, as in the use of the word *efferre*—to bring to rest, instead of the more correct expression, *humare,* to cover with earth, to bury; the German *bestatten* (to carry to the grave), instead of *begraben* (to inter). If, now, in the case of the word at present under consideration, we assume its opposite, viz., *producere, proferre,* the matter becomes clear at once. Previous to the legal or medico-legal inspection, the body of the unfortunate deceased lies exposed to all, it is, as it were, necessarily brought before all—*producitur.* But this ends, when the officials, jurists, and physicians appear, to whom alone the matter belongs. The body is then provisionally removed from view, if not by curtains or coverings, yet just as really by the forthcoming of the officials. It is no longer produced, but specially obduced—concealed; it is no more brought before the public, but removed from them. If to this we add, that the body, when found, is usually brought from without, and for convenience of further examination

carefully covered up and carried off to a definite place, where it is shut or locked up and made no longer accessible [obducirt]; for *obducere* means often enough, to lock up; then, indeed, we can no longer doubt why the medico-legal examination of a body has been termed an obduction, a veiling, a concealing, covering, locking-up or making inaccessible of the same."

4. And lastly, I have to add the following philological explanation:—

"It would, *à priori*, seem singular that a new definition should be promulgated, and generally accepted, if it were not found suitable and more appropriate than that hitherto employed. And truly the word **obductio*, though certainly a novel term for the dissection of a corpse, is extremely appropriate to the circumstances; as we see at once, when we consider as we ought to do in the case of every technical expression, the primary and peculiar signification of the word. For, as the Lexica teach us, *obducere* means originally the same as *obversari, ob oculos versari, obvenire, ob oculos venire*, and the like—that is, to bring before the eyes. Differing from *objicere* and *obvertere* only in the ratio of the differing signification of the radicals *jacere* and *vertere*. For, while of these latter words the one expresses a certain suddenness and the other a change in the direction, *obducere* primarily signifies a calm, reflective and methodical bringing forward or laying down of the body; and has thus, I think, come to be used as the conventional expression for a legal dissection, though it only mediately, or, as it were, by implication, denotes the dissection itself. That the word should in this manner acquire a meaning somewhat opposed, to its ordinary acceptation ought not to surprise us, for every Lexicon teaches us that *recludere* means to open as well as to shut, and similar apparent contradictions are not infrequent; for all of which good and sufficient reason can be given."

It matters but little which of these learned explanations we prefer. The word "obduction" has long ere now acquired the right to circulate, by being invested with official authority; and we shall continue to use it in its official sense.*

* The foregoing chapter contains a very necessary, if not very clear, explanation of the modern (German) use of the word "obduction." The most of it has been omitted from the latest (3rd) edition of this work; it is, however, retained here, as both interesting and useful to the English reader. As there is, however, no valid reason for cumbering our language with any

§ 2. The Dead Body.

Statutory Regulations.

Penal Code of the Prussian States, 1851, § 186. *Whoever buries or in any other way disposes of a dead body, without the knowledge of the magistrates, is liable to a fine of two hundred dollars* (£30) *or to imprisonment for not more than six months.*

If a mother bury, or otherwise dispose of the dead body of her illegitimate child, without first acquainting the magistrate, she is liable to imprisonment for not more than two years.

Previous to the publication of the New Penal Code, there was no need to inquire, What is a dead body? But now, that the clandestine disposal of the most immature fœtus is threatened with punishment, this question is sure to arise whenever a mother has thrown aside her three or four months' fœtus, because upon the answer given must depend whether an official investigation take place or no. In fact, I myself have several times had to answer this singular question, and it has also been asked at sundry other times and places, and will be so again. To such a question, a medical man can only reply, that a dead (human) body is a dead human being. And there can be no doubt, that in ordinary medical language, a dead fœtus is a dead body, and this all the more, that in case of dispute it would be difficult to say what else it was? The Supreme Court of Justice has, however, in its decisions, repeatedly given a different opinion for the guidance of jurists. Proceeding on the supposition, that that cannot be dead which has never lived, and could not live, The Royal Ober-Tribunal has in one case pronounced the following judgment:—"The meaning of the expression 'dead body,' can only be determined with relation to the practical purposes of the law, and the ordinary acceptation of the term, and, therefore, the viability of the child must in every case be ascertained before the term dead body can be applied to it." And, in a second case, it has decided, that "inasmuch as a fœtus born at the fourth or fifth month, and proved to be unviable, as has been established in the case in question, cannot be regarded, either according to ecclesiastical usage or civil law, as a

useless word, I shall henceforth replace it by its equivalents—Examination—Dissection—Autopsy—Medico-legal examination, or Inspection of the body.—Transl.

dead body to which the directions and regulations respecting burial are applicable, therefore, also the punitory enactment, § 186 of the penal code, is not applicable to this case."* The legal view of the matter does not therefore so much regard the vegetative-organic life which the fœtus had *in utero*, as whether it possessed a capacity for maintaining a separate existence—whether, in short, it were viable. Only after this period has been attained, is, according to our superior courts of law, a dead human being to be considered a dead body. This is a most important point, and we shall return to it, when we come to consider the evidence of life afforded by the hydrostatic test.

* S. Goltdammer, Archiv für Preuss. Strafrecht, i. 4 heft. s. 571; and for the correct estimate of this view, *ibid.* 3 heft. s. 396.

PART FIRST.

OBJECT OF THE EXAMINATION OF A DEAD BODY.

§ 3. General Statement.

The medical inspection of a human corpse may have a threefold object. 1. To establish the live birth and viability of a new-born child, where both are doubtful. 2. To ascertain the unknown period at which the death occurred. 3. To determine the unknown cause of death. Taken singly, the last is indubitably the most usual and most frequent object of the examination, but the first also very commonly occurs,* while the necessity of determining the period of death from the *post-mortem* appearances, though not so frequent, yet presents itself sufficiently often to the medical jurist. And instances involving two of these questions, and even all the three, in the case of one body do also occur. We must consider each separately.

* In Berlin (and probably in all large towns) new-born children form fully one-fourth of all the cases of medico-legal inspection.

CHAPTER I.

ON THE VIABILITY OF A CHILD

§ 4. Definition of the Term.

Statutory Regulations.

General Common Law. Part II., Tit. 2, § 2. *In opposition to the legal hypothesis (that every child born in lawful matrimony is the child of the husband), no allegation of the husband can be received, unless he can convincingly prove that he has had no matrimonial intercourse with his wife between the* 302*nd and* 210*th days previous to its birth.*

(Rhenish) Civil Code. Art. 312. *The husband may deny the paternity of the child, where he can prove that it was physically impossible for him to have had matrimonial connexion with his wife within the* 300*th and* 180*th days previous to its birth.*

Statute of 24th April, 1854. § 15. *He is to be deemed the father of an illegitimate child, who has been proved to have had connexion with its mother, between the* 285*th and* 210*th days previous to its birth.*

General Common Law. Part I., Tit. 1, § 17. *Births without human form or appearance have no claim to family or civil rights.* § 18. *In so far as such monsters live, they must be nourished, and as far as possible preserved.*

General Common Law. Part. I., Tit. 9, § 371. *Should the succession to an heritage depend upon the possible* live birth *of a fœtus yet unborn, at the death of the previous possessor, this event must be waited for.*

Ibidem. Part I., Tit. 12, § 13. *The* live birth *of a child is to be held proven, when it has been heard to cry by witnesses of unimpeachable veracity present at its birth.*

(Rhenish) Civil Code. Art. 725.—2. *A child which is* not viable *at birth, &c., cannot inherit.*

(Rhenish) Civil Code. Art. 906.—*Nevertheless, the bequest or testament shall only be in force when the child is born* viable.

A new-born child is presumed to be viable when, from its maturity, and the formation of its organs, it seems to possess the capacity for maintaining a separate existence,—*i. e.*, of probably attaining the average term of human existence.

Both conditions must, however, coexist. A well-formed fœtus at the fifth month cannot, in the foregoing sense, be supposed to possess the capacity for maintaining a separate existence, nor, in like manner, can this be said of a tenth month's fœtus afflicted with congenital ectopia of the thoracic organs, atresia of the rectum, or the like.

A short life of minutes or hours is here purposely excluded. This opinion coincides with that of several distinguished jurists,—*e. g.*, Mittermaier in his new work (*Arch. d. Crim. Rechts.*, Bd. vii., 1. s. 318), and Edward Henke (*Handb. d. Crim. Rechts.*, ii., s. 58), who even regards a life of several days as of no consequence, when the child is not truly viable; whilst other well-known lawyers maintain an opposite opinion, and hold, that if the child have lived only the shortest possible time after its birth, it is to be regarded as viable, and to be possessed of all the privileges of such a child, as regards legitimacy, inheritance of property, &c. Moreover, the very statute books differ one from the other, for whilst the Prussian Common Law (quoted above), only requires proof of the child having been *born alive* to ensure its succession, the civil code and the statute books formed after its model, such as the Sardinian (*Code Civil*, iii., 2, 705), require also that the child must be viable. But the medical jurist may leave all such juridical questions to the lawyers, and rest contented with the medico-legal definition already given, knowing that no physician in the world would say that a child born in the fifth month, or even a mature child born with complete occlusion of the œsophagus or the like, even if it have breathed a few times, or lived for a short while, could yet maintain a separate existence. If in any individual case the judge, for judicial purposes, may desire to know if the child, which the physician has declared non-viable, have lived, he will easily be able to obtain the requisite information.—There seems to me, however, to be no doubt, as to the answer to the question how far *congenital malformations*, which may be remedied by art, exclude the supposition of viability? This question has been recently vehemently discussed in the French

Academy, and Robert has maintained the opinion that a child must always be declared to be viable, even if it have a congenital malformation, necessarily fatal if let alone, but which may be remedied by operation, even should that be dangerous, and experience show that its results have been but rarely favourable, and much more so should the congenital malformation, necessarily fatal if let alone, be remediable by some simple procedure, such as a puncture through the merely cuticular occlusion of the rectum, or through the prepuce. Trousseau and Devergie most justly decidedly oppose this view. Robert's example of congenital absence of the rectum, which has been successfully remedied by the formation of an artificial anus in a few rare cases, affords a most striking example of the practical untenableness of his position! The production of such views in court, would open up at once the old contest about the so-called degrees of lethality (*vid.* Spec. Div., § 2), would revive the question of accidental lethality, and lead to vexatious discussions about proper and improper medical treatment. In such a case the social position of the parents, their ability to procure the best medical advice immediately after the birth of the child, the skill and boldness of the operator, the possibility of an efficient after treatment, &c., would all conduce to establish a difference in the viability of the children of rich and poor parents, of dwellers in the city, and of dwellers in the country, &c., and all these points would be just so many sources of dispute between the parties. For the same reasons it seems hazardous to reckon, as some French authors do, as a third condition of non-viability, such diseases as the child may bring into the world with it, and which are mostly fatal.

According to most of the modern penal codes (except those of Prussia and Wurtemberg), the murder of a child non-viable from immaturity or fatal malformation is only accounted an attempt to murder. The Prussian code does not recognise any non-viable children, the word viable not being found in the statutes. And it would thus at first sight appear that the medical jurist need not trouble himself at the inspection with the criteria of viability. But as, on the one hand, it is evident (§ 2.) that in certain conditions, according to the authentic interpretation of the statutes concerned, it may certainly be necessary for the attainment of the judicial object to ascertain and determine the viability of the child; so on the other, the civil code (as quoted) contains certain definitions respecting the viability of a child, which may possibly require to be considered in

the course of the inquiry, though no likelihood of this may appear at the time of the examination of the body. Now, as ever, therefore, the criteria of viability must continue to form part of the medico-legal inquiry in the case of the body of any new-born child. And with reference to this, the presumed age of the fœtus is certainly the most important question. Congenital defects of so important a character as of themselves to render a continuance of life impossible, are of extremely rare occurrence, and are then so self-evident, that a doubt as to their importance can scarcely arise. As regards the uterine age of the fœtus, the ancient medical strife about the limits of viability has, fortunately, had statutory bounds set to it,* so that discussions on that point have now only a scientific value, and are no longer of practical utility to the medical jurist, who has now solely to determine if the fœtus have attained the legal *terminus à quo* the viability commences. The period of 180 days (six calendar months) fixed by the Rhenish statute book, although it have the authority of the Hippocratic writings in its favour, is in no respect so consonant with nature as the period of 210 days (30 weeks or 7

* We feel necessitated so far to expound the statutes:—If their object be, as the lawyers have said, solely to determine the probable father of the child, then it is not easy to see why the 210th day should have been pitched upon and placed alongside of the 280th. That, however, the statutes thereby intended to define that fœtal age at which the child is fitted for a separate existence, which is our opinion, is convincingly proved, amongst other things, by the regulations of the obsolete Prussian penal code (General Common Law, Part II., Tit. 20, §. 958), according to which a "perfect," that is, a "perfectly mature" child, and "a fœtus which is already more than 30 weeks old" (that is, more than 210 days) "are to be *looked upon as the same.*" In respect to the pointing out of such a *terminus a quo* from which to reckon viability, the Roman law, with its 182 days (according to Hippocrates), has long been in the van. How wisely the lawgivers have acted in setting determinate bounds to the opinions of each individual physician, will be acknowledged by every one at all acquainted with the chaos of fabulous tales on this head extant in both old and new collections and compendiums of Medical Jurisprudence. I need only now refer to the well-known case of Fortunato Liceti, who attained the age of 79 years, and is said by one author to have been born at four months and a-half, by another at five, and by a third at six months, to have been at birth only a span long, and to have been preserved, and, as it were, hatched in an oven, as the Egyptians do chickens!! I am well acquainted with the few well-authenticated and carefully observed cases, particularly the deservedly famous one recorded by D'Outrepont. But these few scattered observations, amid the great majority of cases, form rare exceptions, which but confirm the rule.

calendar months), which epoch is distinctly marked by the disappearance of the pupillary membrane, and by the descent of the testicles, and has all experience in its favour. The task of the (Prussian) medical jurist is therefore to ascertain and declare whether the fœtus have attained a uterine age of from 180 to 210 days respectively.*

§ 5. Of Monsters.

In the statutory regulation already quoted, reference is made to the case of monsters, and the question may therefore be asked, is a given fœtus a monster? But the answer to this, as to all similar questions in legal medicine, must be made not so much in accordance with the views of pathological anatomists as with the requirements of the statutes and the object of the judicial inquiry; and we, therefore, declare a *monster to be a fœtus with its organs so anormally formed that it is thereby rendered incapable of maintaining a separate existence.* Though ever so perfect in "human form and appearance," a fœtus born with atresia of the rectum must therefore be declared a monster (Common Law, as already quoted). On the other hand, pathological anatomists are accustomed to include a mere surplus of fingers or toes among monstrosities, yet no one would venture to deny "family or civil rights" to such a child, if otherwise well-formed; it could not therefore be legally pronounced a monster. Moreover, the medical jurist has nothing to do with the denial or the confirmation of rights, and the questions of this sort that so often occurred in the olden practice of judicial medicine, such as, whether baptism should be refused to a monster or no? &c., belong to the antiquities of the science. The physician has only to answer the question, Is this fœtus a monster? and he will scarcely find a more fitting definition than that given above, particularly if he wishes to avoid losing himself amid the various theories of the Pathologico-Anatomical Schools. Whether the law and the judge will desire to find a further distinction for their decision in the answer to the question, has the fœtus lived or not? may be left to themselves.

As now, according to this idea, a monster and a non-viable child are almost synonymous terms, so we also find this view carried out in other respects by the legislature in that of Baden and of Hesse, and even that

* On Viability, see Special Division, § 78; and on the Determination of the Age of the Fœtus, § 79.

of Prussia, with its negative regulations. For example, our penal code no more recognises a monster than it does an unviable child. A dead monster can, therefore, according to the legal interpretation of the term (§ 2.), be no more recognised as a "dead body" than a fœtus unviable from any other cause. We cannot avoid seeing, however, why a difference should be made between the two.

Both the following cases of monstrosity have given rise to legal examination. The first occurred while the old penal code remained in force. The second is doubly instructive; first, as an example of an extremely rare form of congenital monstrosity, and second, because it affords a striking example of a new-born child being, in spite of the most normal "human form and appearance," yet a monster in the sense already explained.

Case I.—A Brainless Monster.

This case was that of a female anencephalous fœtus. Absence of the occipital bone allowed the cerebellum to hang down in its membranes at the back of the head as a bloody tumour, the size of a turkey-egg, in which, however, brain-matter was discernible. A portion of brain pap lay in an anormal cavity found by expansion of the first two cervical vertebræ. The shapeless head was deeply sunk between the shoulders, the dermoid tissues covering the chin adhered to those of the chest, so that a proper neck was absent. There was also a *spina bifida* of the whole canal down to the sacrum, and serous effusion into the thoracic cavity.

Case II.—Congenital Diaphragmatic Hernia.

This case was that of a remarkably well-formed and perfectly mature male child, which had notoriously lived four hours, and was supposed to have died of hemorrhage from neglect of the midwife. Indeed, the linen covering the child was much stained with blood, the whole body was of a waxy-white, and the lips pale. Immediately on opening the thorax, the unusually deep position of the diaphragm—between the eighth and ninth ribs,—attracted attention. The right half of the diaphragm was then seen to be deficient. In its centre, a triangular opening, bordered by a white, almost cartilaginous rim, in which a part of the right lobe of the liver lying in the thorax had got strangulated. With

the right lobe of the liver there lay also in the right thorax several coils of the colon, which completely filled it,* these were empty, but the rest of the gut lying in the abdomen was distended with meconium. Behind these abdominal organs in the thorax, lay the right lung, firm in texture, of a clear brown colour, and not larger than a bean, affording proof of at how early a period of uterine life the hernia had occurred. The liver, spleen, and ascending vena cava contained a fair amount of blood, proving that no very considerable hæmorrhage could have occurred. The heart was remarkably flat and broad, empty of blood, but normal internally.

The accused midwife declared that the child was quite livid when born, and looked as if it had been "dipped in indigo." Of course we gave as our opinion that the child was not viable, and had died from congenital malformation and not from hæmorrhage.

The results of the *docimasia pulmonaris* in this remarkable case were extremely interesting. I have already described the condition of the right lung. The left lung was of a brown colour, marbled with bright red. Both lungs and heart weighed only 1 oz. and 13·7 grains imp.; without the heart they weighed but 6 drachms, 23·93 grains imp.; with the heart both lungs floated; separated from it, the left floated perfectly, while the right sank under water all but two little pieces. As might have been expected, incision of the left lung alone was followed by escape of bloody froth and audible crepitation.†

* Not only are cases of congenital diaphragmatic hernia extremely rare, but its occurrence on the right side is a still more infrequent occurrence.

† A precisely similar case of congenital diaphragmatic hernia on the left side is related by Mecklenburg, in my Vierteljahrschrift, vii. s. 160.

CHAPTER II.

SUPPOSED PERIOD OF DEATH.—SURVIVORSHIP.

Statutory Regulations.

General Common Law. Part I., Tit. 1, § 39. *If two or more men lose their lives in a common mischance, or else so nearly at one time that it cannot be ascertained which died first, it shall be assumed that no one of them survived the others.*

Civil Code. Art. 720. *Where several persons, some of whom are reciprocally the heirs of each other, perish by the same mischance, so that it cannot be ascertained which died first, the survivorship is to be determined by the circumstances of the case, and in default of these, according to the vigour of the different ages and sexes.*

Art. 721. *When those, who have perished together, were under fifteen years of age, the presumption is that the oldest was the longest liver. When they were all above sixty, the presumption is that the youngest was the longest liver. When some were under fifteen, and others above sixty, the presumption is that the first lived longest.*

Art. 722. *When those who have perished together were fully fifteen years of age, but were under sixty, the presumption is that the male has been the survivor, provided the age has been similar, or that the difference has not exceeded one year. If they were all of the same sex the presumption is that the survivorship has been that usual in the course of nature, viz., that the younger persons have survived the older.*

§ 6. General Statement.

In discoursing on the object of the inspection, the question of the probable time at which the death occurred has not usually been touched on by most authors. Others refer to it only in relation to the question of survivorship. This, however, is a great defect, as every experienced medical jurist must often have felt. For it fre-

quently happens, that the presiding judge, at the termination of an inspection, desires to know the probable time of the death? the answer to this query being often, in the case of men long missing, and then found dead, and in that of new-born children, of the utmost importance. In a case of robbery attended by murder, an old woman was the victim, and at the inquest, the traces of the guilty perpetrator were, as often happens, quite obscure. She had certainly been seen alive and in health on Saturday evening, and had been found murdered early on Monday. Suspicion attached to several men, some of whom were in the habit of trafficking with this lone-living woman in the evening, and others early in the morning, and it was important to ascertain, whether she had been murdered late on Saturday night, on Sunday morning, or on Sunday evening, in other words, at what time did her death probably occur? In another case of robbery and murder, which shall also be subsequently detailed, it was likewise important to ascertain whether the deed had been done on Saturday, on Sunday, or early on Monday morning, on which day the body was found. For the chief suspicion rested on the house-servant of the deceased, who had disappeared on Sunday, and who could not reasonably be supposed to be the murderer, if the crime had been committed only on Monday. Our decision as to the probable period of the death, was shortly after confirmed by the confession of the murderer, the house-servant referred to. Again, in two other similar cases, I had not only to determine the day, but the very hour of the murder! To give yet one more instance, a young man suddenly disappeared one night under most remarkable circumstances. After the most wonderful reports of the nature of his death had been spread abroad, a body, which to all appearance was his, was dragged from the water three months subsequent to his disappearance. How long has this body been in the water? became then a most important question, the answer to which was most essential for the settling of its still doubtful identity, as in truth is often the case in respect of the drowned. In like manner in the case of new-born children, especially when the examination has ascertained the fact of a violent death, the determination by the medical jurist of the probable period of death—which is likewise that of birth, may probably lead to traces of the guilty mother. Though similar problems are of constant occurrence, and I myself could multiply manifold the number of instances, yet the question of survivorship in respect to several persons found

dead together is really one of uncommon rarity. I myself have only once (cases 168-171) had to answer such a query, and the entire literature of the subject affords only a few isolated cases. Here there is a free opening for the most arbitrary opinions, for seldom indeed can safe grounds be found for any other. It is usually held (according to the precedent of the Roman Law, which has been followed by the (Rhenish) Civil Code in its regulations, as well as by all the Italian statute books, which are similar to the latter), that the age, sex, and constitution, the various kinds of death, the positions in which the dead are found, and the different stages of putrefaction in which the bodies are discovered, afford sufficient grounds for correct judgment on this head. But all these conditions are variable, and permit of no certain conclusions being drawn from them; and if any general dogma could be maintained on such a question, it would be this, that there is in such cases no universally valid guide for the judgment, but that each case must be decided according to its own peculiar circumstances. If we suppose three men to be slain in the same tumult, A. by a sabre-cut on the head, B. by a bayonet-thrust in the heart, and C. by a gunshot-wound through the jugular vein, no one would hesitate to declare, that in such a case, B. must have died first, that C. must have borne his hæmorrhage a little longer ere he died, and that A. must have succumbed to his wound last of all. But who shall decide, which of two or three men thrown into the water at the same time, shall last have died? A whole family were consumed in a house burned to the ground, the father (a tailor), his wife, and their three children. The whole five were partly roasted, and partly charred. We were not asked to decide the question of survivorship in respect to these five persons, but we were, nevertheless, bound to be prepared to answer such a question. It shows the wisdom of the statute books, therefore, from the Roman one down to the most recent, that for all such cases, in which it is impossible to give a scientific opinion, they have given positive injunctions for the regulation of the judicial procedure. That, however, the investigation of the medical jurist is not excluded by either of the two statute books in force in Prussia, and, therefore, that the judge must always in the first place have recourse to medical skill, is shown by the following words in the passages quoted above from the statutes: "that it cannot be ascertained," &c., so that in every case an attempt at least to "ascertain," must be made. A comparison of the relative advance of putrefaction in the different bodies is

indubitably the most trustworthy of all those criteria mentioned, and as this forms also a most important element in determining the answer to the general question, "When did this man die?" it is of consequence to enter more at large upon it.

§ 7. Signs of Death.

At the instant of death the organism commences to return to an equilibrium with the outer world. It is dead. It speedily succumbs to external influences. It putrefies. In a traditional anxiety to prevent the confounding of apparent with real death, men have endeavoured to discover ever newer and more "certain" signs of death. Amongst the most recent of these, I need only mention Frank's statement regarding the easy separability of the conjunctiva from the cornea, Nasse's thanatometer, &c. But these are but scientific curiosities. The usual well-known signs of death are amply sufficient for all the purposes of diagnosis, and legal medicine might well be proud had it as convincing an answer for every question. In order to determine the actual period of death, it is necessary to consider the sequence of the phenomena occurring between the extinction of life and the commencement of putrefaction; these occur in the following order:—

1. Respiration and circulation have completely ceased, and not even the faintest murmur is heard on auscultation.

2. Immediately after death the eye loses its lustre. Who has ever lifted the eyelid of any one just expired and not remarked this peculiar dull listless stare? Of course, light has no longer any action on the pupil, as, indeed,

3. No stimulus has now any power of producing a reaction. For the present, I omit as irrelevant all reference to electrical experiments; by-and-by; I shall have to relate my own remarkable experience of their action on dead bodies.

4. The whole body grows ashy-white. Persons with a particularly florid complexion retain this often for days after death. The red or livid edges of ulcers do not assume this deadly paleness; neither do red, black, or blue tattoo marks disappear, if not effaced during life. Further, an icteric hue existing at death never becomes white, and ecchymoses retain in every case the hue they had at time of death—livid, or greenish-yellow, &c., as the case may be.

5. The animal heat possessed at the moment of death is retained

for some time, as the dermoid tissues are bad conductors. Fat seems to be a peculiarly bad conductor, and very fat bodies retain their heat, *cæteris paribus*, much longer than very lean ones. In general, other circumstances also exert an influence on this gradual cooling, particularly the temperature of the medium in which the body lies, and the nature of the death it died. With regard to the first of these, it is well known how rapidly bodies cool in water, which in the hottest summer is always colder than the air. In cesspools, dungheaps, and the like, bodies retain their heat proportionately longer, from manifold causes, and the same is also the case with bodies remaining covered in bed. With respect to the second—the kind of death—it is said that those killed by lightning remain much longer warm than others; this I am uncertain about, as I have not had the experience of one single case; it is, however, quite certain, that in like circumstances persons who have died from any kind of suffocation, take a considerably longer time to cool than others. In the case of an old and very fat woman who had been strangled, we found, for example, some thirty hours after death, the body cold indeed externally, but internally, in both thorax and abdomen, retaining a degree of heat quite perceptible to all the by-standers. As a general rule, consonant with experience, most bodies are quite cold in from eight to twelve hours.

6. Immediately after death a general relaxation of the muscular system occurs, the first token of the loss of the *turgor vitalis*, soon to be followed by others. A BODY WHICH ONLY PRESENTS THE ABOVE SIGNS (1-6) MAY BE REGARDED AS THAT OF A MAN DEAD FROM TEN TO TWELVE HOURS AT THE LONGEST.

7. A valuable evidence of the loss of the vital turgidity is afforded by the soft or inelastic condition of the eyeball; this is very evident in every body after from twelve to eighteen hours, and may sometimes be sooner felt. The living eyeball, from the tension of its fluids, under all possible circumstances, even when dying, ill of cholera, or the like, gives an elastic resistance to the pressure of the finger, but by the time mentioned this has ceased, the eyeball feels flaccid, and the longer after death the more buttery it becomes, till in an early stage of putrescence it bursts and runs out.

8. The same cause—loss of vital turgidity—occasions the well-known flattening of the muscles on those parts of the body on which it lies, not only on the buttocks and calves, but also on the flat side of the superior and inferior extremities, on the hips,

or fronts of the thighs, according to the position assumed in dying, and maintained after death.

9. Hypostases result from the gravitation of the blood in the capillaries in obedience to the laws of inert matter. We therefore find them chiefly on the depending parts of the body, most usually on the entire under surface of the body, the back, nates, and calves; but also very frequently, and the longer the period since death, so much the more probably, on the face, ears, sides of the chest and extremities, for, as Engel has rightly pointed out, there is also an upper and an under surface to all these parts. These hypostases begin to form in from eight to twelve hours, and they increase in extent and size till the commencement of putrefaction. They are of themselves a sufficient evidence of the reality of death. They are divided into external and internal hypostases.

§ 8. Continuation of the Subject.—External Hypostases.

a. External hypostases,—subcutaneous hypostases,—post-mortem stains,—are a most important post-mortem appearance, because the inexperienced are liable to confound them with ecchymoses,* and, consequently, with traces of violence committed previous to death; and, indeed, often enough do so confound them. These are, however, very easily distinguished from one another by comparing the results of incision in the parts discoloured; no incision into a post-mortem stain, be it ever so deep or bold, will ever give vent to effused fluid or coagulated blood; at the most, there will be but a few bloody points, the result of cutting across some small veins in the skin, whilst in the smallest ecchymosis the effused blood will at once be brought to light by the incision. (*Vid.* Plate II., Fig. 2, for a representation of an incised post-mortem stain.) As this simple proceeding affords an infallible means, and there is no other, of distinguishing between post-mortem stains and ecchymoses, so the medical jurist ought never to omit solving his doubts by making an incision, and individual medical referees or courts of reference are perfectly right, when this has been omitted, to impugn the statements of those who examined the

* I may mention here that ecchymosis from violence is constantly termed by Casper "sugillation;" but as this term is often used to express what he has more correctly called "hypostasis," I have avoided its use altogether, as only liable to mislead.—Transl.

body, with all their consequences. As proof of the great importance this question may sometimes assume, I cannot refer to a more instructive instance than that contained in the celebrated trial of the murderer Schall.* Those medical men who had examined the body had affirmed that "ecchymoses" existed on its superior and inferior extremities, "as if the murdered person had been firmly grasped by some one" by these parts. The defender of the accused, who maintained his plea of not guilty in a most skilful manner, had built his whole defence upon this statement, endeavouring to make it appear that several persons must have assisted at the murder, and that it could not have been committed by the prisoner alone. The medical men who made the original examination of the body, had, however, neglected to examine these so-called ecchymoses by incision, and I, therefore, as medical expert to whom the case was referred by the jury court, was obliged to deny the correctness of their conclusions, and to leave it still open to doubt whether these so-called ecchymoses were not merely post-mortem stains. This opinion was afterwards confirmed by the confession of the murderer himself made at the time of execution; for, according to this, there had been no struggle which could eventually have produced ecchymotic marks, neither had any second person been present at the murder, but Schall himself had killed his enemy by suddenly shooting him through the head.

The colour of these post-mortem stains varies from a livid or coppery-red to a reddish-blue. They are never, as may be readily understood, in the least degree elevated above the skin, but ecchymoses often are so. Their form is extremely irregular, sometimes striped, round, roundish, or angular, &c. At first, they appear in somewhat isolated patches, the size of a walnut, an apple, a hand, or a dinner-plate; by-and-by they run together, and then cover whole regions of the body, half of the back, or the whole back, and the like. Age, sex, and constitution have no influence in their formation. They are formed after every kind of death, even after death from hæmorrhage. Although Devergie† thinks the reverse, and quotes one case in favour of his views, yet, supported by my very extensive experience, I must maintain my own opinion, which will certainly be found correct in every case.‡ Devergie's single case is, moreover, so far irrelevant,

* Casper's Vierteljahrschrift, &c., i. s. 292; and Edinburgh Monthly Journal, Sept. 1852, p. 311.

† Médec. Legale. Paris, 1835, i. p. 81.

‡ *Vide*, among other cases subsequently related, Cases LXXV. and

that no mention is made at what period after death (which resulted from cutting the throat with a razor) the dissection was made, and whether this did not take place during the time betwixt the death and the period at which these hypostases are usually formed. It would be also, *à priori*, difficult to perceive why these stains should not form after death from hæmorrhage, since that is far from draining the body of all its blood, and, as we shall afterwards see, even in such cases, internal hypostases indubitably do form. Engel thought that these post-mortem stains could be made to disappear by incising the depending portions of the body; and although such an attempt is not to be expected in any medico-legal case, yet I have several times experimented on dead bodies with this view, and have found that the stains became indeed smaller and paler, yet could never be entirely made to disappear.

§ 9. Continuation.—Internal Hypostases.

b. Internal hypostases occur, especially in the following organs:—

1. In the brain this condition is manifested in cases of congestion of the cranial cavity by a still more marked congestion of the veins of the pia mater of the posterior hemisphere, when the head rests, as it usually does, on the occiput, and even in cases of anæmia of this cavity this partial congestion is still perfectly visible. And this hypostasis of the vein is never absent in cases of death from hæmorrhage, as many cases yet to be related will confirm; and it is important to remember this, lest a doubt should be raised as to the occurrence of any death from hæmorrhage from the quantity of blood existing in these veins or in the posterior sinus. Whether, when this hypostasis does not form soon after death, it can be made to form by altering the position of the body, seems doubtful. At least one experiment which I made on the body of a female poisoned with sulphuric acid, by placing it with its head hanging down for four-and-twenty hours, six days after death, was quite without result. It is very important not to confound this daily-occurring phenomenon of cerebral hypostasis with cerebral hyperæmia (apoplexy),

CXXXVII. In another case of suspected murder not related, and which was found, on examination, to be a case of death from hæmorrhage from the vessels of the stomach, the body was so drained of blood, that even the pulmonary artery and the vena cava were found perfectly empty; and, nevertheless, we found, on the second day after death, the whole of the back covered with one unbroken stain, of an unusually deep coppery-red.

a most likely mistake, and one which inexperienced persons are apt to commit, erroneously diagnosing death from an "apoplexy" which has no existence. (*Vide* Special Part, § 53.) The extremely correct representation of such a hypostasis (Plate I., Fig. 1), will help to make this description plain.

2. The most constant of all the internal hypostases is that of the lungs. Orfila dates its orgin from twenty-four to twenty-six hours after death; but it arises at a much earlier period, viz., at that when the blood begins to sink downwards in obedience to the laws of gravity. The whole posterior surface of both lungs, about a fourth of the entire parenchyma, is in all bodies (lying on their back) much darker coloured than the rest, and betrays by incision, even in anæmic lungs, a perceptible congestion. This is so striking as readily to deceive the inexperienced, and lead them to an incorrect diagnosis of the cause of death, as apoplexy of the lungs, pneumonia, &c., and this is especially the case where the blood is generally dark-coloured, and more or less pulmonary œdema is present, in which conditions one is more apt to assume the results of the disease to be present, while, after all, a post-mortem or cadaveric phenomenon is the whole that exists.

§ 10. Continuation.—Internal Hypostases.

3. Among the abdominal organs, hypostases chiefly occur in the intestines, and,

4. In the kidneys. Those portions of the intestines lying in the pelvis are most especially apt to be affected in this manner. The livid-red coloration of the inferior surface of the intestinal convolutions may also in this case mislead, and this post-mortem appearance may be taken for the result of disease. But the diagnosis is easy; the convolutions only require to be pulled forward, where the breaks which here and there interrupt the continuity of the coloration, at once distinguish it from the redness of inflammation, which always stretches uninterruptedly over the part affected. The hypostasis of the kidneys is specially confined (in bodies lying on their back) to their posterior half, and can therefore be readily distinguished from a general congestion of those organs.

5. The hypostasis of the spinal cord has been hitherto almost entirely disregarded, and yet it is well worthy of notice, from the misconceptions to which it may lead. Its appearance when developed in the veins of the *pia mater* is all the more apt to be taken for

the evidence of pre-existing meningitis, that, from the facts of the difficulty of opening the spinal canal, and the rarity of its being required in medico-legal dissections, the medical inspectors are generally pardonably ignorant of what is to be seen, and are all the more readily led to imagine the existence of an inflammation when the case seems to point in that direction, when, for instance, evidence of violent blows having been given on the back has been made out. The best way to ascertain the correctness of these remarks is to take the first most suitable body, that has lain a few days on its back, and examine it specially for these hypostases. A most correct representation of the appearance described, will be found in Fig. 1 of Plate X. of the Atlas.

§ 11. Continuation.—Coagulation of the Blood after Death.

6. The heart is not subject to the occurrence of hypostasis in it; on the contrary, it is distinguished above every other organ or blood-vessel by the occurrence in it of the so-called cardiac polypi, which are known to every medical man, though he may have only dissected a few bodies in his own private practice. This phenomenon is of important significance in the forensic diagnosis of the dead, and we shall most conveniently discuss it here. It is well-known that the "cardiac polypi" are nothing else than the coagulated fibrine of the blood, either pure and colourless, or more or less stained with its colouring-matter, are consequently only coagulated blood. This coagulation is not to be supposed to take place before death. In the case of a prolonged agony, such may be the case; and these polypi may sometimes form in the interval between life and death; but certainly in most cases they are formed after death, during the gradual cooling of the body. When we thus see that the blood may coagulate after death, in other words, that dead blood may coagulate, it is not easy to understand how the existence of coagulated blood in and upon a wound in a dead body can lead with any certainty to the conclusion, that such an injury must have been inflicted during life, "because blood cannot coagulate after death!" This is but one of the many erroneous opinions which have obtained currency in forensic medicine by its being left in the hands of pure theorists; so, for example, Henke* quotes this "coagulation of the effused blood in ecchymosis," as a sign that the violence which produced it must have been

* Handbuch, s. 570.

inflicted during "life;" and when we consider the great estimation in which Henke was so long held as an authority in this department, we cannot wonder that even medical boards of inquiry, as I well know, should still maintain the opinion, that coagulations of blood found in the body must have been formed during life! But older anatomists and forensic practitioners have already rightly maintained an opposite opinion, and whoever has himself examined many bodies cannot for one instant doubt the truth of it. Engel* most correctly says, "I do not believe that there is any disease or kind of death, in which the blood does not coagulate in the dead body; it may happen in any one case that the blood is not coagulated, but there are always other cases of the same disease or kind of death in which the blood is coagulated." Bock† indeed fixes a time (about four hours) after death, where he supposes the coagulation of the blood to begin. We may add to these testimonies, the actual and frequent occurrence of coagulation of the blood in the bodies of still-born children. I do not mean only the daily phenomenon of effused and coagulated blood in the meshes of the cellular tissue beneath the scalp, but the most incontrovertible coagulation in internal organs.

A seven-months' fœtus was medico-legally dissected, because of supposed cranial injuries, which were not, however, confirmed. The application of the hydrostatic test conclusively proved that the child had been dead-born. Nevertheless, we found that most rare phenomenon in new-born children, coagulated blood in the sinuses of the much-congested cranial cavity. Moreover, the lungs were in the most unique manner besprinkled with subpleural capillary ecchymoses (*Vid.* Spec. Div., §§ 40-83), which also speckled the heart like a tiger-skin. One would think, that facts of daily occurrence, such as the coagulation of dead blood after venesection, the coagulation of the drops of blood escaping from the dead body, and the like, should long ere this have sufficed to quash this serious error! Experiment, however, also supports observation. Brücke has proved that the access of air to the blood, which cannot indeed take place in the body, does not contribute materially to the coagulation of the blood; and also, that the most careful exclusion of the air cannot maintain the blood fluid. But the blood after death must, nevertheless, coagulate according to laws we know nothing about. It is, for instance certain, as many of the following cases show, that

* Darstellung der Leichenerscheinungen. Wien, 1854, s. 156.

† Gerichtl. Sectionen, u.s.w. 4 Auflag. Leipzig, 1852, s. 19.

after some kinds of death, in which permanent fluidity of the blood is supposed to be characteristic, such as the various kinds of suffocation, cases not unfrequently occur in which the blood is found more or less coagulated, and also, what appears wholly inexplicable, that in certain organs and vessels this coagulation seems preferably to occur, not only in the heart, particularly in the right ventricle, but also, for instance, in the inferior vena cava, the liver, &c. (*Vid.* Case CCCIX). THE THESIS, THEN, THAT COAGULATED BLOOD IN THE NEIGHBOURHOOD OR INTERIOR OF A WOUND IS A PROOF OF LIVING ACTION, BECAUSE AFTER DEATH THE BLOOD NO LONGER COAGULATES, IS INCORRECT, AND EVERY DEDUCTION FROM IT ERRONEOUS. And the following interesting cases are given as proof of the opposite view.

CASE III.—RUPTURE OF THE HEART.—EFFUSION OF BLOOD.

A woman, aged 59, was instantly killed by being run over by a carriage. The body was of a waxy-white, and so far seemed to justify the supposition of internal hæmorrhage, although externally no trace of violence was visible. On examining, by incision, the *post-mortem* stains on the back, a considerable quantity of extravasated blood was discovered extending over half of the back to beyond the nates, and this blood was partly fluid and partly coagulated. There were no fractures of the spinal column nor of the pelvis, but the cause of death was found to be a rupture of the heart. The right auricle was separated from the ventricle by a jagged tear, only remaining attached to it by a small strip of muscle. The substance of the heart was neither softened nor atrophied, but perfectly healthy. The pericardium was distended with blood, partly fluid and partly coagulated, *i.e.*, there were coagula floating in the fluid blood. The brain was quite bloodless, all but the hypostatic congestion of the posterior veins. The lungs were moderately, and the liver somewhat strongly, congested with blood.

CASE IV.—GUNSHOT-WOUND OF THE LEFT VENTRICLE OF THE HEART.—COAGULATION OF THE BLOOD.

A workman, aged 30, shot himself in the breast; the ball penetrated close above the fifth rib, and tore away the entire apex of the left ventricle. The whole of the left pleural cavity was distended with blood, and we scooped the coagula in whole potfuls from among

the fluid blood. I think no one will doubt, that in this case, in which death must have been instantaneous, the blood could only coagulate after death, and the following direct experiment is just as convincing.

Case V.—Injury to the Head Inflicted after Death, with subsequent Coagulation of the Blood Effused.

We have already made, and still follow out, various experiments on the dead body in relation to wounds on the head (*Vid.* Special Division, § 6), employing for that purpose the common solid wooden block, used to support the head and backbone. On one occasion, we inflicted several powerful blows with this instrument on the perfectly uninjured head of a drowned person, three days after death, and the next day (thirty hours subsequently) the body was examined. The most interesting part of the record on examination for our present inquiry runs, word for word, as follows:—

"7. On the upper edge of the right ear there is a lacerated wound, a quarter of an inch long, with jagged bloodless edges.

"8. About the centre of the right parietal bone there is a contused wound, one inch in length, with obtusely lacerated edges, at the bottom of which there is some fluid blood. A precisely similar wound is situate over the occipital bone, and the greater part of the bottom of this wound over the pericranium is covered with a coagulum one line in thickness." Consequently, the blood in this case must indubitably have coagulated three days after death. The rest of the blood of this drowned person was remarkably fluid.

Case VI.—Coagulation of the Blood Four Days after Death.

An even more remarkable occurrence took place in the case of a person poisoned by carbonic acid gas, whom we examined on a very cold day in January, four days after death. The body had lain in a cold place appointed for exhibiting the dead (Morgue) till the examination took place. In opening the thorax and removing the larynx and trachea, some blood accidentally escaped over the neck and left shoulder, and coagulated on the body, which was extremely cold, and that so quickly, that before the

end of the dissection it could be lifted up on the handle of the scalpel as a true coagulum.

The following cases also belong to this category:—

Case VII.—Coagulated Blood in a Still-born Child.

This male foundling was already, when discovered, blackish-grey on the head and green on the rest of the body, from putrefaction. The lungs were, however, very well preserved. They were of a clear brown colour, and did not quite fill the cavity of the chest. The hydrostatic test correctly employed showed that the child had been still-born, and yet the umbilical cord was distended with coagulated blood,—another proof how little value is to be placed on the criterion of ecchymosis as proof of the child having breathed.

Case VIII.—A Similar Case.

The external appearance of this newly-born fœtus indicated that it had not attained to the thirtieth week of uterine life, for the nails and cartilage of the ears were still soft, the length was only sixteen inches, and the weight only three pounds and a-half, &c. The application of the hydrostatic test would not have been necessary had not the law expressly ordered it; it however proved with certainty that the child had never breathed either before or after birth, as there was not the slightest indication that could lead to a suspicion of respiration having occurred. Nevertheless, on the occiput, there was an extravasation of coagulated blood, the size of a dollar. The mass of the brain was much congested with blood, but the individual portions of it could not be more narrowly inspected on account of putrefactive softening.

Case IX.—A Similar Case.

An eight-months' female child, still attached to the placenta, was found dead in a churchyard. On testing the lungs hydrostatically, every portion of them sank completely under water, and on being cut into no crepitation took place, and no bloody froth escaped, affording thus indubitable evidence that no life (respiration) had in this case existed, either before or after the completion of the birth. And yet there was in the middle of the forehead a circular, reddish-

brown spot, the size of a shilling, soft when cut, and beneath it in the subcutaneous cellular tissue a true ecchymosis of coagulated blood.*

§ 12. Continuation.—Cadaveric Rigidity.

10. Cadaveric rigidity is the concluding indication of the earliest stage of death, and one which in every case precedes the commencement of putrefaction. This rigidity consists, as is well known, in a shortening and thickening of certain muscles, particularly the flexors and adductors of the extremities, inclusive of the fingers, and of the elevators of the lower jaw, whereby they become firm and hard to the feel, and impart to the corpse a somewhat athletic appearance, as Devergie has correctly remarked. It passes from above downwards, begins on the back of the neck and lower jaw, passes then into the facial muscles, the front of the neck, the chest, the upper extremities, and, last of all, the lower extremities. Usually, it passes off in the same order, and once gone it never returns, and the body becomes as flexible as it formerly was. Cadaveric rigidity may come on at any period after death during a tolerably wide interval of time, in general, however, between eight, ten, and twenty hours, and it may continue much longer than is usually supposed, viz., from one to nine days. In spite of my numerous observations on bodies drowned, I cannot confirm Sommer's† opinion that in bodies lying in fresh water it may last fourteen or more days. The most recent and excellent investigations of Brücke, Ed. Weber, Stannius, Kölliker, Brown-Sequard, Maschka, Kussmaul, Pelikan, &c., do not agree in regard to their views of the ultimate nature of this process. Even a repetition of the same experiments does not always lead to the same result. We know not whether the old idea, revived by Brücke, of the coagulation of the fibrinous nutritive material within the muscle, or the death of the nerves in the muscle (Stannius), or that of a peculiar molecular change of the muscles (Kölliker), &c., is the correct one. There is, therefore, nothing for it in the meantime,—and this is, moreover, sufficient for the practical purposes of legal medicine,—but to continue to make observations

* Among the cases in §§ 33 and 41 of the General Division, and §§ 8 and 15 of the Special Division, will also be found abundant other evidence to prove the *post-mortem* coagulation of the blood.

† Diss. de signis mortem hominis, &c., indicantibus. Havniæ, 1833, quoted by Kussmaul; über die Todtenstarre in d. Prager Vierteljahrschr. 1856. 50 Bd. s. 67, &c.

on the occurrence of this *rigor* in the body under the most various circumstances in which it takes place, either more readily or with greater difficulty. It seems quite established that this rigidity either does not occur after narcotic poisoning, or is then of so short a duration that at the usual time when such bodies are received by the medical jurist for examination, no trace of it is to be found. Whether this rigor mortis occurs after death from lightning, as has been both maintained and contested, my own experience does not permit me to decide. I have never observed *cadaveric stiffening in the immature fœtus.* Since, however, this phenomenon has been observed by others, particularly in Maternity Hospitals, even in such fœtuses,—though, as they themselves confess, it is always in such cases only feeble and transitory,*—so, though we cannot positively deny its occurrence in such fœtuses, yet it is non-existent so far as the medico-legal dissecting-table is concerned, since these bodies never come so early to it. Even in the case of mature new-born infants and little children, the cadaveric rigidity is feeble and transitory. That this is also the case in old people as some have supposed (Sommer), I not only cannot confirm but can prove the contrary. That the rigor mortis does not take place at all, or only late, or in a transitory manner in cases of death from any kind of suffocation, is an erroneous though oft-quoted opinion; for, as the collection of cases in the special division following will show, we have never observed any difference in this respect between such bodies and those who had died from other causes. Whether in cases of death from cramp or acute diseases, the rigor mortis comes on suddenly and goes off as quickly, and whether after sudden death in healthy persons, and after death from exposure to cold, it comes on more slowly, and lasts longer, &c., are all theoretical opinions, and require confirmation all the more that there is the widest difference respecting them in different authors. A low temperature and the existence of alcoholization indubitably favour the long duration of the cadaveric stiffening. In one case in which death occurred suddenly from cerebral hæmorrhage during intoxication, I have observed the rigor mortis persisting on the fourth day; in a second case, in which the man, while drunk, hanged himself, it was still present on the seventh day; in a third, a man shot, in winter, still on the sixth day; in a fourth case, that of a young waiter, who had gone to bed in apparent health, and had died during the night from an apoplexy

* Schwarz, die vorzeitige Athembewegungen. Leipzig, 1858.

of the heart, and was found dead in bed in the morning (in December), the rigor mortis was quite discernible on the inferior extremities so late as the eighth day after death; and in the case of a man who died suddenly while intoxicated, from congestion of the lungs (in November), the rigor mortis was still perceptible on the ninth day (Case CCXVIII). In cases where the cadaveric rigidity is unusually persistent, it is not uncommon to find it co-existing with putrefactive discoloration of the body; advanced putrefaction does not therefore necessarily abrogate this condition. It seems certain that this rigor never fails to occur in every corpse, and the popular idea, grounded on thousands of unprejudiced observations, that the body must be washed and dressed as quickly as possible before it stiffen, seems worthy of all consideration. The stiffness of a frozen body can never be confounded with the rigor mortis, for a frozen body is from head to foot stiff as a board, while in cadaveric rigidity the extremities, particularly at the elbow and knee-joints, always preserve a certain amount of mobility. A BODY, THEREFORE, THAT ONLY PRESENTS THE ABOVE-MENTIONED (1-10) SIGNS, MAY BE PRESUMED TO BE THAT OF A PERSON WHO HAS DIED WITHIN FROM TWO TO THREE DAYS AT THE LONGEST.

§ 13. The Process of Putrefaction.

In order to determine the probable period of death, it is of course necessary both to know and also to estimate correctly the various stages of putrefaction. But difficulties now for the first time begin to accumulate. For if on the one hand, we find it not easy adequately to describe, in words intelligible to the inexperienced, the changes which the dead body gradually undergoes in respect to the colour and consistence of its organs; so on the other, we know that the circumstances, which influence the putrefactive process, and variously modify it as regards acceleration and protraction, are so numerous as to demand the utmost caution in endeavouring to establish any fixed rule in relation to it. And, therefore, Orfila scarcely exaggerates when he asserts, that to ask a medical man to determine the probable period of death of a putrefied corpse, is to require what is wholly "beyond the power of man;" but when we learn, as Devergie did from his subalterns, the watchers of the dead in the Morgue at Paris, and as I have frequent occasion to observe in mine in the institution here, that wholly uneducated men acquire

by mere practice perfectly accurate general notions on this head, we see it must be possible to attain this object yet more certainly by scientific means. Only these must be as far as possible arranged under definite heads, and the whole matter as much as may be simplified, lest those generalities which constitute the rule be lost in the chaos of a thousand multiplicities—for, strictly speaking, is not one putrified corpse, seen under generally similar circumstances, just like another!

The few recent authors, Orfila, Lesueur, Güntz, and Devergie,* who have related their own experience in this matter, are not free from this objection. Whoever has been engaged in similar repulsive and troublesome investigations will readily recognise the value and truthfulness of the individual observations of these men, and will prize them accordingly; but their communications are of no real practical value to the medical jurist, partly from being overlaid by too many and too minute details, and partly from the absence of a correct generalization and classification of the phenomena observed. I shall now endeavour to obviate the difficulties inherent in this subject, so far as its nature permits, restricting myself as far as possible to my own personal experience, and regarding solely practical utility.

§ 14. Subjective or Internal Conditions which Modify the Putrefactive Process.

The conditions which modify the putrefactive process in so manifold a manner, accelerating it in the one case, and retarding it in the other, so that the corpse A, can acquire in 24-36 hours precisely the same appearance as the corpse B in from three to four weeks, are either inherent in the individual, or arise from external causes, not forgetting, of course, that putrefaction itself can only originate in the access of external influences, for recent flesh hermetically sealed does not putrefy.

The progress of putrefaction is specially modified by:—

1. *The Age.*—I admit the fact, asserted by all authors, that the bodies of new-born children putrefy, *cæteris paribus,* more rapidly than

* Orfila and Lesueur, Handbuch zum Gebrauch bei Gerichtlichen Ausgrabungen. Aus d. Franz. von Güntz, 2 Bde. Leipzig, 1832-35. Güntz, Der Leichnam des Neugebornen, Leipzig, 1827 (rich in antiquarian literature). Devergie, Med. Leg. i. p. 88-253.

others. But I must qualify this admission by the statement of another fact which I have not hitherto seen prominently brought forward, viz., that the bodies of such new-born children as become the objects of medico-legal observation are, from the very nature of the matter, almost without exception, those that have been subjected to one influence additional to those usually incident to the corpses of those of maturer age, for immediately after birth they have been exposed, flung into the water, a dungheap, or a privy, *naked,* or at the most wrapped in a few rags, and are found in this state, whilst the bodies of those of maturer age found naked belong almost exclusively to drowned persons. Clothing, however, exercises a most material influence in retarding the putrefaction of a corpse (*Vid.* § 15). The bodies of very aged people certainly yield more slowly to the advances of putrefaction, but this indubitably depends in some measure on their natural condition (*Vid.* No. 3).

2. I cannot allow that *sex* of itself has any influence in this matter. The "more lymphatic constitution" of the female is in respect to this a purely theoretical assumption. I have, however, always found that the bodies of women, dying immediately after, or during childbirth, do putrefy, *c. p.*, extremely rapidly, whatever the cause of death may have been.

3. *The condition of the body* exercises a most unequivocal influence in this matter. Fat, flabby, and lymphatic corpses putrefy, *c. p.*, much more rapidly than lean and juiceless ones, for an abundance of fluids is very favourable to the occurrence of decomposition. As the bodies of aged people usually present the latter condition, this is probably the reason why they keep so much longer fresh.

4. *The kind of death* very materially modifies the course of the putrefactive process. This commences, *c. p.*, much later after sudden death in healthy persons, than after death from exhausting diseases combined with putridity of the fluids, as typhus, dropsy consecutive to organic disease, tuberculosis, putrid fevers and the like.—Bodies; which have been much injured or mutilated, as those of persons killed by repeated acts of violence, by many incised wounds, by mechanical injuries on railroads, &c., putrefy very rapidly; those only excepted who have been overwhelmed by the fall of walls, &c., and who lie dead, buried beneath a mass of joisting, rubbish, or sand, so that the air has less direct access to their bodies. Persons suffocated in smoke, carbonic oxide, and sulphuretted hydrogen gas, putrefy, *c. p.*, rapidly; whether this also occurs in the case of perons suffocated by

other irrespirable gases, I have had no personal opportunity of ascertaining. It is, however, certain that after death from narcotic poisoning, putrefaction is also relatively much accelerated. This, however, is far from being the case after death from other poisons, and in particular it is not found to occur in that form of poisoning, which has quite recently been practically introduced to our notice, poisoning by phosphorus. In alcoholic blood-poisoning, such as exists where drunkards die apoplectic during a debauch, I have frequently found the body to remain fresh a most disproportionate time; in the cavities of such corpses the smell of alcohol is usually distinctly perceptible (*Vid.* Cases CCXVI.-CCXX.). In this case, the whole body is as it were preserved in spirits. It is, finally, deserving of notice, that in cases of poisoning by sulphuric acid (which so often come before us in Prussia), the putrefactive process is decidedly retarded, probably because the presence of the acid in the body hinders the development of ammonia, or perhaps, because the ammonia formed during decomposition is immediately neutralised by it. It is by no means rare to find the bodies of persons poisoned by sulphuric acid perfectly fresh and devoid of smell, even after opening their cavities, at a period after death when, under different circumstances, this would certainly not have been the case. After poisoning by arsenic, putrefaction ensues according to the usual laws, but, as is well known, a subsequent pause takes place, after which the process of mummification commences—but we will return to this by-and-by (*Vid.* Special Division, § 42). Though all these causes have indeed a general validity, it is, nevertheless, certain that subjective conditions must exist, of which as yet we know nothing, which are capable of accelerating or retarding putrefaction. The following observation is extremely instructive and demonstrative of the truth of this. On the 20th of March, 1848, I examined the bodies of fourteen men, almost all of the *same age,* 24-30 years, previously occupying precisely the *same social position* (workmen of the lowest class), all lying together in the *same* part of our deadhouse, who had all met the *same* death, having been shot on the barricades on the 18th of March, and had all notoriously died at the *same* time. Here there certainly existed those identical conditions so necessary for instituting a comparison, and yet I can testify that in no one case did the signs of putrefaction resemble those of another. Another remarkable instance was afforded by the bodies of an old couple of about the same age, 50-60 years, suffocated during the night by carbonic

oxide gas. Up to the time of our examination, these bodies had been exposed to precisely similar influences, and yet (on the fourth day after death, in November) the body of the man was quite green both on the abdomen and the back, and the trachea was brownish-red from putridity, &c., while his uncommonly fat wife was perfectly fresh both outside and in. It is evident, that any little difference in the times of their respective deaths could have had no proportionate effect here, as it could not have amounted to more than a few hours at the longest.

§ 15. Objective or External Conditions which Modify the Putrefactive Process.—*a.* Air.

The external conditions which accelerate or retard putrescence have a more decided action than the internal ones, or at least their action is better known. These active agents are—atmospheric air, moisture, and warmth. If to these, light and electricity are sometimes added, we must remember on the one hand, that both of these agents have been already included as co-operating with the atmosphere, and on the other, that their action in this respect is still too hypothetical.

1. Whatever favours or prevents the access of *atmospheric air* to dead animal (or vegetable) substances promotes or impedes their putrescence. Therefore, bodies lying (or hanging) in the open air, rot, *c. p.*, much more rapidly than those buried in the earth, or even than those lying in the water (drowned); corpses that are not at all, or only lightly clothed, putrefy more rapidly than those that are clothed, and particularly, than those that are clothed with tight-fitting or almost impermeable stuffs. It is quite a usual thing, in the case of men taken out of the water perfectly clad, to find the legs covered by the boots quite fresh, while the cuticle on the rest of the body is already raised in blisters or peeled off. The body of a very crooked tailor, who had hanged himself, showed already evident traces of putrefaction everywhere but on the thorax, which was in marked contrast to the rest, just because the deceased had girt himself with a tight-fitting spencer of stout ticking, well-stuffed on the side opposite to his hump, and probably worn with the view of concealing it! The nature of the soil has also considerable influence in preventing or promoting the access of the air, and according as that is loose and porous, as sand, or firm and compact, as clay, so do the bodies buried

in it putrefy more or less easily; but here we encounter another agent, viz., moisture, which may equalise the conditions, or even turn the scale in the opposite direction, and whose share in the matter, so far as it is affected by the nature of the soil, is truly important. Sandy or chalky soils are, for instance, dryer, and turfy or clayey soils moister. The same cause, the easy or more difficult access of the air, occasions bodies buried near the surface, as those of newborn children often are, to putrefy faster than those more deeply interred. And finally, for this same reason, the coverings surrounding the body in the earth are important objects of consideration, and of this Orfila (*op. cit.*) gives numerous proofs. We all know how rapidly the common pinewood shells fall to pieces, and their inmates with them, and for how uncommonly long a time the pristine great ones of the earth remain comparatively unconsumed within their coffins of hard wood, of zinc, or of stone, or indeed in an encasement of all three. Inversely, bodies buried in the earth quite naked putrefy very rapidly.

§ 16. Continuation.—*b.* Moisture.

2. Without water and watery vapour no decomposition can take place. But the body has sufficient water in itself to supply ample material for this. It gradually vaporizes and bursts in time the external coverings, particularly those of the abdomen, but also those covering the thorax, and at last, even the skullbones, and the body macerates in its own fluids. Long before this, maggots and larvæ are found on its surface, at first only in the folds of the skin, about the eyelids, the ears, the pudendal region, and the groins, till they increase to myriads, and of themselves complete the entire destruction of the soft parts. But the greater the quantity of moisture in addition to its own, which can and does reach the body from without, so much the more rapidly does it putrefy, and *vice versâ*. And this is indubitably the reason why bodies found in the water putrefy so much faster than those in the earth. The same cause also, with the co-operation of the third agent, warmth, favours the uncommonly rapid putrescence of bodies found in dungheaps and cesspools (*Vid.* Case XV.). When, on the other hand, putrefaction takes place under circumstances of great drought, the body dries up and becomes mummified.

§ 17. Continuation.—*c.* Warmth.

3. An increased temperature of itself, by evaporating the natural moisture of the body, acts much more energetically than the mere absence of external humidity in producing the direct opposite of putrescence, the desiccation of the corpse, or even its roasting or charring, as we see in the cases of death from burning. But increased temperature, when its action is combined with that of the other two agents already mentioned, air and moisture, favours putrescence in exact proportion to its degree. Every one knows how much more rapidly bodies putrefy in summer than in winter. At a temperature of +16° to 20° R. (68°—77°F.), I have frequently seen bodies, in a perfect state of preservation one day, become by the next almost, and in twenty-four hours more, perfectly unfit for dissection; whilst under precisely similar circumstances, *e.g.*, kept in the same deadhouse at a temperature of—5° to 6° or 8° R. (20°·75, 18°·5, or 14° F.) in winter—this is by no means the case, even after a lapse of ten or twelve days. Should the body be lying in water, the influence of a difference of temperature is even more remarkable. A corpse frozen in water or moist earth, may remain perfectly fresh for so long a time that thousands of years is no exaggerated term to apply to it,—a fact well evinced by the preservation of the soft parts (partly, indeed, converted into adipocire) of a mammoth, dug up in Siberia, which I myself have seen in the University Museum at Moscow. A corpse which has been ten or twelve days in water during winter, at a temperature of +2° to 6° R. (36°·5, 45°·5 F.), may be so well preserved as still to present all the signs of death from suffocation, which are often no longer evident after it has remained only from five to seven days in water in summer, at a temperature of +18° to 20° R. (72°·5,77° F.). In regard to this, however, there is still another item to consider. We know that the temperature beneath the surface of the water is always lower than at or near its surface, upon which alone the heating power of the sun's rays is expended, hence it happens that putrescence proceeds with more or less rapidity according as the body has lain near the surface of the water or been sunk in its depths, by heavy stones attached to it, or by being entangled among piles, &c. All these circumstances require to be considered,—and the medical jurist will be able easily to ascertain them, even though he should not, as is seldom the case, have been present at the finding of the

body,—if it be required to determine the probable period of the death from the amount of putrefaction present. But in respect to this, we must also remember that bodies taken out of the water and exposed to the air putrefy with extraordinary rapidity, so much so, that one day of such exposure works a greater change than three or four days longer retention in the water would have produced. Whether the mere change of medium be the cause of this, or whether any other agents have a share in it, I do not pretend to determine. Further, as in the water so also in the earth, and for the same reasons, a higher or lower temperature affects the rapidity of putrescence, and from this cause (as well as for the reason already stated, § 15), bodies buried near the surface putrefy, *c. p.*, more rapidly than those more deeply interred.

§ 18. Comparison of the Phenomena of Putrescence according to the Media.

It is extremely perplexing to the practitioner to have the different stages of putrefaction separately described, according to the different media in which the body may happen to be, as has been done by the chief authorities on this subject, Orfila, Devergie, and Güntz, this being all the more superfluous that the phenomena and course of putrescence is in every case the same, only modified as to its rate, and that not only by the media, but also by all the three qualifying circumstances already (§ 15—17) detailed. It seems, therefore, more expedient to establish a general ratio for all the three media, air, water, and earth, along with which may be reckoned, in individual cases, the influence of the above-mentioned co-operating agents, and deductions in the one case, or additions in the other, made accordingly. However difficult it may seem to fix such a general [illegible]o as may assist the judgment in this manner, yet my own experience would lead me to conclude the following proportion to be not far from the exact truth :—*At a tolerably similar average temperature, the degree of putrefaction present in a body after lying in the open air for one week* (*month*) *corresponds to that found in a body after lying in the water for two weeks* (*months*), *or after lying in the earth in the usual manner for eight weeks* (*or months*). Three bodies will therefore exhibit, *cæt. par.*, nearly the same degree of putrescence, of which A, shall have been lying in the open field for one month ; B, in the water for two months, and C, eight months buried in a

coffin in the usual manner. Any very important error will be avoided by attending to this ratio, with the requisite attention to the modifying circumstances involved in each individual case.

§ 19. Chronological Succession of the Phenomena of Putrescence.—Externally.

The largest proportion of the bodies that find their way to the medico-legal dissecting-table are such as have been lying in the open air, and we take these, therefore, as the type from which to describe the progress of putrescence.

1. The first sign—in point of time—is the well-known greenish coloration of the abdominal coverings (the exception to this rule in the case of drowned persons will be considered afterwards (*Vid.* Special Division, § 48), and along with this the peculiar odour of putrescence becomes developed. According to the degree of temperature, and the different subjective conditions (§ 14), this discoloration may take place in from 24-72 hours after death.

2. Within the same period the eyeball becomes soft, yielding to the pressure of the finger.

3. After 3-5 days, reckoning from the period of death, the green coloration has become deeper, and spread over the entire abdomen, inclusive of the external genitals, on which, however, the colour is of a brownish-green or dirty appearance. In the case of many bodies, particularly such as have been asphyxiated, a bloody frothy fluid wells from the mouth and nose. At the same time, but with great topical irregularity, large or small patches of green begin to make their appearance on other parts, particularly on the back, the inferior extremities, the neck, and the sides of the chest.

4. In about eight or ten days the discoloration, along with which the peculiar odour is developed *pari passu*, has become darker and more generally spread over the body by the confluence of the isolated patches. On particular parts, such as the face, and down the neck as far as the chest, the colour is now a reddish-green, from the shining through of the decomposed blood, now effused into the cellular tissue. The gaseous products of decomposition have now begun to be developed and to distend the abdomen; they are usually, but not always, combustible gases, such as sulphuretted and phosphuretted hydrogen, and a tolerably long flame may be produced by making a small puncture through the inflated abdominal coverings, and apply-

ing a light to the escaping gases. The cornea has fallen in and become concave, the colour of the eyes is still recognisable, but the open condition of the pupil in immature embryos cannot now be determined in every case. The *sphincter ani* is relaxed. On certain parts of the body, particularly on the extremities, neck and breast, the cuticular veins wind like dirty-red cords amid patches of paler skin. The nails are still firm.

5. Fourteen to twenty days after death, the hues of putrescence have spread uniformly over the entire body, which is now bright (frog) green and blood-red brown. The epidermis is raised here and there in blisters the size of a walnut, and in other parts, patches of it, the size of a dinner-plate or larger, are quite stripped off. Innumerable maggots cover the body, affecting chiefly the folds of the skin and the natural outlets. The development of gas has now increased to such an extent, that not only does the abdomen seem like a huge mound, and the thorax artificially inflated, but even the whole of the cellular tissue is blown up, so that the body has a gigantic appearance, the features are of course thereby completely masked, so that the recognition of the body is almost impossible, even by those who were well acquainted with its former appearance, as we may well imagine, when we think what a change in the physiognomy is produced by the eyelids, lips, nose and cheeks, being all greatly swollen. The colour of the eyes is also no longer distinguishable, for the eyeball, in which iris and pupil are no more visible, is in all such bodies, without exception, of a uniform dirty-red colour over the whole of the sclerotic. In men, the *penis* is now quite shapeless and swollen to a colossal size, the *scrotum* discoloured like the rest of the body may attain the size of a child's-head. The nails and their roots are detached and lie loose and easily separable. The hair of the head is loose, and easily pulled out. The occurrence of this advanced stage of decomposition is very decidedly influenced by the temperature of the air, so that if we compare the two extremes of + 16° to 20° R. (68°—77° F.) in summer, and 0 to + 8° R. (32°—50° F.) in winter, we shall find that the former will produce as much change in 8-10 days, as the latter case in from 20-30 days. In this stage the whole body, as already mentioned, swarms with maggots, and if it has lain in the open air or water, it is by no means unusual to find that other animals have been devouring it. These are (chiefly) land and water rats, and also dogs, cats, birds of prey, foxes and wolves. Our river-fish do not attack dead bodies. Traces

of this voracity are found on the thorax and abdomen that are often enough eat into, or on the extremities, whole patches of which are often eaten down to the very bone. Openings into the cavities, and specially injuries to the soft parts that have thus arisen, can with a little attention be *readily distinguished from traumatic lesions*. From such a condition of the body as we have here described, it may with some degree of certainty be concluded, that according to the varying temperature and medium it must have been *at least* so long dead as we have already indicated, but not that this has been the *longest* period that could have elapsed subsequent to the death, for this stage of putrescence is distinguished from the earlier ones, in that it may continue for a long time, many weeks or even months, passing then gradually into the next stage. BODIES GREEN FROM PUTRIDITY, BLOWN UP AND EXCORIATED, AT THE EXPIRY OF ONE MONTH, OR FROM THREE TO FIVE MONTHS AFTER DEATH (CÆT. PAR.), CANNOT WITH ANY CERTAINTY BE DISTINGUISHED FROM ONE ANOTHER.

6. The stage of colliquative putrefaction commences ordinarily in from four to six months, or sooner in the case of bodies that have lain in warm and moist media. The continuous development of gas has burst the coverings and exposed the cavities of both thorax and abdomen. Even the sutures of the skull have yielded to the pressure and are burst, the brain run out; the orbital cavities are empty, all the soft parts have commenced to break down into a soft pulp, or are partly, and so much the more the later the period, already broken down, absorbed and vanished, leaving entire bones bare and exposed, particularly those of the skull and extremities. The bones of the extremities are also now often separated at the joints by the destruction of the fasciæ and ligaments. No trace of a physiognomy is any longer discernible. The existence of female breasts can no longer be determined, and as the external parts of generation have already disappeared, the doubtful sex of the deceased can only be ascertained from the external habitus, where the pubic hair or its mode of growth can be distinguished, which is not seldom the case; a strict limitation of this to the *mons veneris*, denoting, as is well known, the female sex, while its prolongation upwards to the navel denotes the male sex. But, besides this, the sex of any such unrecognisable corpse can also be determined by ascertaining whether a *uterus* be present or no (*Vid.* Cases XIV.—XVI.)*

* With respect to the peculiarities attending the putrefaction of drowned

§ 20. Continuation.—Saponification.

When moisture acts continuously on a putrefying corpse, whether it be lying in water, or only in very damp soil, then, and in such circumstances alone, the progress of colliquative putrefaction is checked, and this check takes place the more readily the fatter the corpse is, wherefore the bodies of children are more apt to become saponified than those of grown-up persons. Under certain conditions, which, with the exception of the two already mentioned, are wholly unknown, many bodies, but by no means all, now undergo a process of saponification, the fatty acids combining with the ammonia and forming the peculiar compound known by the name of *adipocire*.* It is difficult to determine even in a general manner, when this process of saponification commences. There is no doubt that the grave-diggers of the churchyard of the Innocents at Paris, where first observations on the great scale were made on the formation of adipocire (Fourcroy), were greatly in error when they supposed a period of thirty years to be necessary for it. It is formed within a much shorter period, where it is formed at all. Devergie† considers that one year is required to saponify the entire body of a drowned person, and about three years if the body be buried. Besides the following case (XXX.) of partial saponification occurring within a few weeks, my own experience can supply the case of a new-born child, rolled up in coarse packsheet, and buried for thirteen months in a garden with very damp soil, and which was already saponified to the extent of one-third of its whole body (*Vid.* Case XIV.); and also a more recent one, in which the remains of a fœtus were found imbedded in adipocire, and which fœtus was proved to have been buried in a garden exactly six months and three-quarters. The formation of adipocire is not, therefore, likely to occur to any considerable extent in less than three to four months in water, or one half-year in moist earth, though its commencement may be found at a much earlier period, and, once formed, it is easily recognised even by the most inexperienced. Adipocire is a fatty substance, pure white in colour, or of a feebly-yellowish

persons, *vid.* Special Division, Chap. vi.; Death from Suffocation, § 58; and on the Putrefaction of the Embryo *in utero*, § 104.

* For the theory of the formation of adipocire I refer to Orfila, *op. cit.* i. p. 328; and for its chemical examination, *vid.* Wetherell, Archiv. der Pharmacie, 1857, Feb., s. 203.

† *Op. cit.*, i. 97.

tint, extensile between the fingers, cutting soft, and melting at a flame, having a dull cheese-like, and by no means disagreable, odour. The muscular tissue, with its tendons and their sheaths, is the first to undergo this change, but there is no organ or tissue, internal or external, which may not be so transformed. Every part so altered becomes a shapeless mass, in which the original structure can be no longer discerned. According to the experiments of Güntz,* the completely formed adipocire of a corpse has a greater volume than all the fat pre-existing in the body. This circumstance must be carefully considered in determining the weight of a body of a new-born child for the purpose of ascertaining its age, and this all the more that such bodies, when disinterred, are, at any rate, always heavier than they ought to be, from the adhering soil, which it is impossible to remove. I have never seen a whole body *completely* changed to adipocire, and can therefore but confirm Devergie's remarks on this head.†

§ 21. Continuation.—Mummification.

In so far as the mere preservation of the body for an indefinite time is concerned, it may not be inappropriate to assume, as some do,‡ a fatty and a dry mummification. But inasmuch as the "fatty mummification," or saponification, is not only a chemical process, but also one sensibly peculiar, and quite different from the true mummification, so these two transformations ought to be kept perfectly separate, though both have been found co-existing in the same body (Case XXVI.). The term mummification is familiarly used to express that remarkable desiccation of the body, whereby all the soft parts are retained, and therefore in general not only the form but even the features, distorted indeed, are preserved, and assume a rusty-brown colour. The skin of such a body is dry and parchment-like, and cleaves closely to the bones. The odour resembles that of old cheese more than that of a putrefied corpse. The internal organs have partly disappeared, and are partly metamorphosed into a dark-brown dry substance, not recognisable by the unaided eye as an organic substance, and particularly in the

* *Op. cit.* p. 38.

† For examples of the formation of adipocire, see Cases XIV., XV., XXVI., XXIX., XXX., CCCXX.

‡ Siebenhaar, Encyc. Handbuch der ger. Arzneik. Leipzig. 1838, i. s. 474.

abdomen the several parts are so blended together, as to be with difficulty separately distinguished. Toussaint has partly executed and partly collected various microscopic and chemical analyses.* That such a change can be artificially produced in the dead body by injections of arsenical solutions or various methods of embalming was known to the Egyptians long ago. We know but little of the process of natural mummification, and the necessary conditions for its production. It may happen to bodies placed in vaults continually exposed to a drying wind, as can be seen in a body that for about sixty years has lain at Charlottenburg, near Berlin, in an open vault, closed only by an iron lattice-work, which is completely mummified and well preserved; and also to others completely shut off from the air and buried in leaden coffins, and the like.† It seems not to be doubtful that bodies in hot dry sand readily become mummified, and the tales of whole caravans overwhelmed in the sandy deserts of Arabia and found in later times as mummies are not unworthy of credence, since very high temperature, especially when combined with very great dryness, appear to favour the process of mummification, because these influences, as well as a constant atmospheric draught, cause a rapid evaporation of the watery constituents of the body. The bodies of children are said to mummify more rapidly than those of adults, the bodies of females more rapidly than those of males, and lean bodies more rapidly than fat ones. In respect of the influence of the mode of life of the deceased, Rieke,‡ who maintains that natural mummies occur even in the churchyards of Stuttgard, declares that he has heard the grave-diggers there make the same humorous remark which has been put into the mouth of one of their fraternity in the well-known scene in *Hamlet*, Act V. Scene I.,—"a tanner will last you nine year;" but to establish this we must wait for more trustworthy evidence than can be obtained from grave-diggers. It is certain, however, that, once completed, a mummy may last for thousands of years. There could therefore be, in cases of exigency, but little probability of determining the period elapsed since the death of a body found mummified, since the general, though perfectly inexpugnable declaration, that the death must at least have occurred

* *Vid.* Casper's Vierteljahrschr. für ger. u. öff. Med. 1857, xi. s. 203, &c.

† Prof. Demaria, the editor of the Italian translation of this Handbook, asserts that the mummification of bodies is a common occurrence in various parts of Piedmont, and he quotes several examples.

‡ Ueber den Einfluss der Verwesungsdünste, u.s.w. Stuttg. 1840.

long ago, could only in the rarest cases be sufficient for the investigator. For the medical jurist the only cases of practical importance are those of mummification of the umbilical cord in new-born children, and the mummification occurring in bodies after poisoning by arsenic, and we will revert to both of these subjects further on. (*Vid.* §§ 34 and 99, Special Division.)

§ 22. Chronological Succession of the Phenomena of Putrescence.—Internally.

The internal organs of the body never, under any circumstances, yield with uniformity to the putrefactive process. Their extremely different histological structure, the different amount of blood and other fluids contained in them, their superficial or more deep-seated situation, the greater or less imbibition of fluids by them in accordance with the laws of gravity, and finally, the possibility of the access of atmospheric air to them, now easier, and now more difficult, are rather the occasion of the most remarkable differences in this respect. There are organs that require twenty to thirty times as long a period as others to putrefy completely, and the chronology of the putrefaction of the individual internal organs is therefore not only as certain, but affords even a surer support to the judgment in determining the probable period of death than the study of the stages of putrefaction on the external surface of the body. My own long series of observations of bodies in every stage, quite independent of the opinions of others who have also made a study of this subject (Bichat, Orfila, Devergie, Güntz, Hebreard), enables me to lay down the following dogmata as authentic:—

1. The internal organ that first becomes changed by putrefaction is the *trachea*, inclusive of the larynx. In perfectly recent bodies, or such as only begin to show isolated green stains upon the abdomen, the mucous membrane of the trachea in its whole course down to the bronchi, still remains of a deadly paleness, presupposing that the death has not occurred from suffocation or *laryngitis*. So soon, however, as putrefaction has progressed beyond this,—and mostly in such bodies as, though otherwise externally well-preserved, yet present over the abdomen one continuous green hue, consequently, in summer, after three to five, and in winter after six to eight days, while, as yet, no other internal organ presents any visible sign of putridity or alteration from its natural state,—we find the mucous membrane of

the trachea already discoloured, of a uniform dirty-cherry or brown-red, without any vascular injection, for it does not exist, being recognisable even by a magnifying-glass in this discoloration. Whether imbibition, or the immediate access of the external air is the cause of this coloration, must be held as yet undetermined. The inexperienced must be careful to avoid mistaking this simple and early occurring *post-mortem* phenomenon for capillary injection and the result of suffocation, or death by drowning. A comparison of the illustrations (Plate IX., Fig. 19, and Plate VIII., Fig. 23), whereof the former represents the putrefying trachea after a natural death, and the latter, the trachea of a person who has been hanged, may render the diagnosis easier. Difference in age, constitution, and kind of death, occasion in this respect no difference whatever. In the further progress of putrescence, the tracheal mucous membrane becomes olive-green, the cartilages separate from one another, but months pass away ere they disappear in a process of general dissolution.*

2. The brain of new-born children, and of children up to the end of the first year, follows next in the order of early putrescence. Pro-

* I have carefully examined, too, many hundred bodies, with special reference to this condition, without finding one exception, not to be able to assert, that in fit cases other conclusions may be drawn from this early putrefaction of the trachea than the mere determining the period of death. An instance of this is afforded by the following case, referred for ultimate decision to the Scientific Commission for Medical Affairs:—The dissector of this case of doubtful suffocation had neglected to examine the condition of the internal surface of the trachea, and its possible contents. The Commission could not, therefore, declare the supposition of death from suffocation on the part of the medical jurist, to be justified, and made good their reasons in the judgment given. In consequence of this, the public prosecutor was necessitated to require a supplementary explanation from the medical inspector respecting this point. A long time having elapsed since the dissection, the inspector now added from memory to the protocol that the trachea and larynx were empty, and their mucous membrane pale. The protocol made at the time of the inspection stated, however, that the body when dissected was in an advanced stage of putrefaction; and in the supplementary opinion required from us, we were compelled distinctly to declare that the memory of the inspector must in this case be at fault, as our experience, which we have here related, led us to the conclusion, that in a body already in an advanced stage of putrefaction, the trachea was *never* found unaffected by the putrefactive process, but rather that this organ was that in which evidence of putrescence would be earliest found. This case, therefore, remained undecided, and shows that this is no idle question, but one of distinct practical importance.

bably the natural soft condition of this organ in early childhood favours its early destruction, aided indubitably by the easy access which the atmospheric air obtains to it through the fontanelles, as yet only closed by a tendinous-like expansion. And this explains why such juvenile brains putrefy so much sooner than those of adults, which are not only of much firmer consistence, but are protected from atmospheric influences by a continuous covering of bone. It is certain, that while all the other organs are yet entire, and the hues of decomposition are only visible externally, the brain of such young children is already destroyed: it no longer fills the cranial cavity, and is transformed into a more or less fluid, rose-coloured pulp, which at once flows out on removing the cranial bones, and no longer permits any examination of its different parts,—a circumstance which may prove very prejudicial in attempting to determine the actual cause of death in dubious cases of new-born children.

3. There is no organ of the body that after death is found in such various conditions as the stomach. In form it is sometimes small, and sometimes large, now distended with gas, now collapsed, at one time half or wholly filled with the remains of food of every kind, at another empty; no one stomach ever resembles another. Moreover, the coats of the stomach are very readily stained with colouring-matter, so that its mucous membrane displays every possible variety of hue, yellow from bile, bloody, blackish from medicines or dark juices of fruit, &c., ruddy from red wine, &c., leaving entirely out of view the various pathological alterations, produced by catarrh, inflammation, corrosive poisons, and also the post-mortem process of gelatinous softening. The stomach putrefies at a very early period. The first traces of putrefaction appear in from four to six days after death, in the form of isolated patches in the fundus of a dirty-washed red hue, not circumscribed, quite irregular, and either small, or of a size that may amount to that of the palm of the hand, through the red basis of which a few livid venous cords are usually seen to wind. All these appearances are first seen on the posterior wall, where hypostasis assists their formation; but speedily, thereafter, they appear on the anterior wall (*Vid.* the illustrations, Plate IV., Figs. 9 and 10, which represent such a stomach true to nature, and give an idea of the general appearance of this discoloration). Similar livid venous cords are also found simultaneously upon its lesser curvature. In doubtful cases of poisoning, it is most important to recognise and duly to consider this alteration, in order to prevent being hurried

into any premature conclusion. These stains, described by not a few authors as blood-stains, or as "traces of inflammation" (!), which have been assumed to be signs of death from suffocation in persons hanged or drowned, are in truth nothing else than what we have described as the earliest signs of the commencement of putrefaction. The more this progresses, the more the stomach becomes discoloured from a dirty-red to a blackish-grey, and in like proportion its coats become softened, but uniformly through them all. In not one case have I ever seen a separation (excoriation) of the mucous from the muscular coat, as it occurs from the action of corrosive poisons, and which is not to be confounded with the simple emphysematous separation of the mucous coat, purely the result of putrefaction.*

4. The intestines follow the stomach next in the chronological succession of putrefaction, and all that has been said respecting the stomach has equal reference to them.† The well-known bilious staining of the parts of the intestine contiguous to the gall-bladder caused by exosmosis, can never mislead any one who has made even only a few post-mortem examinations. But the hypostatic coloration of the intestinal convolutions, which occurs early, and is specially remarkable when those convolutions lying in the pelvis are drawn forwards, is much more apt to mislead the inexperienced (*Vid.* § 11). In the progress of putrefaction, the intestines become dark-brown in

* I refer to this expressly, because, in an important case brought for ultimate decision before the Scientific Commission, the doubtful question of arsenical poisoning was unjustly disputed, and the separation of the mucous membrane of the stomach in the dead body attributed to the effect of putrefaction.

† I remember no case in which (uninjured) intestines have been found earlier putrefied than the stomach; and the following important case is sufficient proof how indispensable and practically important a thorough knowledge of the chronological succession of the phenomena of putrescence is for the medical jurist:—In a case of suspected poisoning with *vinum colchici*, which occurred in the western portion of the (Prussian) monarchy, the medical man who examined the body had assumed the existence of "inflammation and gangrene of the stomach," and, expressly, *did not* refer "the dusky-red coloration and lacerability of the coats of the stomach" to the otherwise indubitably proved putrescent condition of the body, "*because* the rest of the intestines had *not yet* commenced to putrefy." This supposed "gangrene" occasioned the protraction of this case through all the three technical courts, and the erroneous opinion of the medical inspector was finally rectified by the decision of the Scientific Commission.

colour, they burst and discharge their contents, become greasy, and finally, transformed to a dark pultaceous mass. Orfila thinks he has found in disinterred bodies some portions of the intestinal tube still existing, even where no trace of the thoracic organs was any longer discoverable. I suspect there must have been some mistake in this, such as may very readily occur in examining the organs of bodies exhumed at an advanced period.

5. In most cases, the spleen is preserved to a later period than the stomach and intestines, though in some cases it putrefies sooner than they do,—a circumstance which doubtless depends on its more or less healthy condition. It certainly belongs to the category of organs which are easily affected. It becomes soft, and the longer, the more pulpy, is easily crushed, and when further advanced in putrefaction, becomes of a greenish-steel colour, and so soft that it can be scraped down with the knife-handle.

6. The omentum and mesentery withstand putrefaction much longer than the organs already mentioned. They may, indeed, if free from fat, be found well preserved even several weeks after death, but, if they be loaded with fat, they putrefy at an early period. They become then greyish-green and dry. These organs cannot easily be the source of errors or mistakes.

7. The liver is usually compact and firm, even some weeks after death. In new-born children it begins to putrefy at an earlier period than in adults. Putrefaction commences on its convex surface, which appears as if shot with green, and this colour at a later period occupies the whole organ, which becomes at length coal-black. In like measure its sanguineous contents diminish, as of course is the case in all the organs, by evaporation, and the parenchyma becomes more and more pultaceous. The denser tissues of the gall-bladder are, on the contrary, long recognisable, only the bladder collapses, when it contains no gall-stones, partly from the exosmosis and partly from the evaporation of the bile.

8. The brain of the adult follows next in the succession of putrefying organs. Immediately after death the brain collapses, and this collapse increases the more the putrefaction advances. Singularly enough, the first traces of this are found not on the surface, but on the basis of the cerebrum as a bright-green coloration, which progresses from below upwards, and spreads gradually through the whole brain. Its progress being distinctly traceable from the grey into the white matter. In from two to three weeks (of medium

temperature) the brain becomes soft, but months pass away before the adult brain is transformed into that reddish pap into which the brain of new-born children is so early changed (page 45). A wounded brain, however, like all other wounded organs, putrefies much more rapidly from the easier access of the atmosphere, a circumstance that may interfere with the accuracy of the investigation in cases of penetrating wounds of the head. Those organs hitherto enumerated belong to the first series—viz., those that putrefy early. To the second series, those that putrefy late, belong first of all.

9. *The heart.*—When stomach, intestines, liver, &c., have been for weeks visibly far gone in putrefaction, this dense and firm hollow muscle is still fresh and all its parts recognisable, though somewhat flat and shrivelled, mostly empty of blood, or containing only some greasy dregs thereof. It at last, however, gradually softens, first the *trabeculæ,* and then the walls, becomes soft and greenish, passing into greyish-green, and finally black. The small quantity of pericardial fluid is evaporated by the time the heart's putrefaction has progressed to any extent, leaving the pericardium quite dry. Several months, however, elapse before the heart displays this condition of advanced putridity.

10. In the lungs, the work of decomposition begins about the same time as in the heart, sometimes earlier. In bodies that display externally a high degree of putrescence, looking as if soaked in green, with peeling of the cuticle, &c., the lungs are often found so well preserved, that their structure is perfectly discernible, though the amount of blood they contained may be no longer ascertainable. This incontestible fact affords a most important rejoinder to the objections of theorists (Henke and his followers), to the sufficiency of the hydrostatic test of respiration. For when the lungs of a new-born child, whose body is yet fresh, or shows at most but the earliest trace of putrefaction, as a green abdomen, swim on the surface of the water, Theory at the desk may say, that they swim because the gaseous products of decomposition are developed within them, and render them specifically lighter than water; but Practice at the dissecting-table says, that the lungs never putrefy at so early a period; and that the cases where—relatively to other and earlier putrefying organs—they begin to putrefy at an early period after death, belong to the rarest exceptions. Moreover, putrescence in the lungs is practically unmistakable. Its first traces are the appearance of gaseous bullæ, from the size of a millet-seed to that of

a bean under the pleura, which are so readily recognised as to afford the most simple diagnostic evidence of putridity, and so to make the floating of the lungs from this cause a matter of easy discrimination. These bullæ are at first isolated, and are situated on various parts of the lungs. Afterwards they increase in numbers, till whole lobes, particularly on the inferior surface of both lungs, are thickly strewn with them. The colour of the lungs, in spite of the development of these bullæ, is at first quite unchanged. In the further course of the putrescence it becomes darker, bottle-green, and completely black, and the destruction of the parenchyma proceeds *pari passu* with the deepening of the colour. The lungs become soft, collapse from evaporation of their fluid contents, and finally become completely destroyed.

The following exceptional cases of early putrescence of the lungs are the only ones I have seen in an extremely numerous series of observations of the dead bodies of children.

Cases X., XI., XII., and XIII.—Early occurrence of Putrescence in the Lungs.

(X.) The body of a mature female new-born child, that was born alive, as was afterwards indubitably ascertained, was found dead in the water. The cause of death was hyperæmia of the cranial cavities. The body had, it is true, green patches on its abdomen, but was otherwise apparently well preserved, and had no smell of decomposition. Nevertheless, small gaseous bullæ were found on the upper surface of both lungs. But in spite of this, the evidence afforded by the *docimasia pulmonaris* was in every particular so distinct, so harmonious and demonstrative, that we could not hesitate to assume as certain, that the child had lived after its birth, an opinion which, as we have said, was afterwards fully confirmed.

(XI.) In a second case, that of a child born at maturity and dead from apoplexy—most probably caused by strangulation by the umbilical cord—though the body was quite fresh, there were, particularly on the surface of the left lung, numerous gaseous bullæ, of which one was the size of a small white bean.*

(XII.) In a third case, it was truly astonishing to find in the body of a perfectly mature child—which was so fresh, as to present (in

* *Vid.* On the Decomposition of the Lungs. Spec. Div., § 94.

April, at a temperature of + 9° to 10° R.=52°·25 to 54°·5 F.) only post-mortem stains on the back, and not the smallest trace of colour on the abdomen—the gaseous bullæ of decomposition already developed on the lungs, which were otherwise perfectly fresh. One vesicle at the base of the left lung was the size of a pea, and 6-9 at the base of the right lung were of the size of millet-seeds. There was no doubt that the child had lived, and had died of apoplexy soon after its birth.

(XIII.) The fourth case occurred in the body of a new-born mature male child, found in the streets on the 27th of April (at a temperature of + 8° to 10° R.=50° to 54°·5 F.). Its abdomen was in truth green, but the lungs were still perfectly fresh, as was to be expected at such an early stage of putrefaction. They were of a fine rosy-red marbled with blue, completely filling the thoracic cavity, crepitated strongly, and on incision gave vent to a bloody froth. The bases, and part of the inferior lobes, were, however, strewn with numerous vesicles the size of a millet-seed, which were the unquestionable product of decomposition, and which, as is always the case, formed little pearl-like elevations beneath the pleura.

11. The hard and firm kidneys succumb to the putrefactive process later than the lungs and the heart, and are never—or at least as rarely as any of the organs here enumerated as those putrefying late—found affected by putrescence in a fresh or only half putrefied body. At a later period they become first of a chocolate-brown, then they soften, though their granular texture remains perfectly distinguishable, and finally, long after death, they are found of a greasy consistence, easily lacerable, and blackish-green in colour. Still longer than the kidneys,

12. The urinary bladder is preserved, whether it be empty or more or less full; it does not yield to putrefaction till all the organs already mentioned are far advanced in decomposition.

13. The gullet by no means putrefies *pari passu* with the rest of the intestinal canal, but possesses a much greater power of resistance, and after many months it is found tolerably firm, and only coloured of a greyish green long after stomach and intestines have ceased to exist as objects of accurate observation.

14. As for the pancreas, we must have before us a completely putrefied body to find it affected by putrescence. This process colours it of a dirty-red, and so it long remains, till at last it yields to the general destruction.

15. The diaphragm also belongs to that series of organs which are late of putrefying. True, it acquires green patches within the first few weeks after death, but its muscular and aponeurotic tissues can be distinctly distinguished one from the other even after the lapse of from four to six months.

16. Small blood-vessels coursing through putrefying organs, do not come under observation. The larger vessels, however, particularly arterial trunks, succumb to the process of destruction at a much later period than all the contiguous soft parts. In one case related by Devergie* the aorta was still perfectly recognisable in a body exhumed after fourteen months.

17. Finally, I must (in opposition to Orfila) assert the claim of the uterus, over all the other soft parts, to the possession of the greatest power of resistance to the putrefactive process. It is found still occupying its own position, tolerably fresh and firm, of a dirty-red colour, and so well preserved that it can be cut open and its interior examined, when not one of all the other organs is any longer a fit object for examination. The great importance which this fact may assume, in determining the existence or non-existence of suspected pregnancy long after the period of death, is well displayed in the remarkable case given below. (XV.) This fact also holds good with respect to new-born female fœtuses; age, therefore, has over it no influence. Such bodies come frequently before us in the most advanced stages of putrefaction, as might be naturally expected, as in a large town still-born, or speedily dying new-born bastards, are constantly—partly to conceal the birth, and partly to save the costs of burial—secretly made away with, thrown into privies, sewers, or drains, or buried in cellars or gardens, &c., and found there often after the lapse of a considerable time. But in such cases we always find the uterus visibly preserved, even where the decomposition is most general and complete, so that in such cases it is possible to determine the sex long after the complete destruction of the external genitals. Most decisive evidence of this protracted preservation of the uterus is afforded by the following cases:—

Case XIV.—Formation of Adipocire.—Recognisable Uterus.

A human fœtus was dug out of moist garden soil in March. It

* *Op. cit.* I. s. 133.

was quite black, and the whole surface matted with straw and the remains of plants. The head had dropped off, and at the time of examination only a few skull bones lay near the trunk. That the sex was no longer externally recognisable needs scarcely to be mentioned. The trunk was eighteen inches long, and weighed four pounds and a-half. The muscles of the trunk and the extremities were already converted into adipocire. The thoracic and abdominal organs were coal-black and no longer distinguishable, except the empty bladder, which was still distinctly visible. But the dirty-red uterus, perfectly preserved, still maintained its proper position. We could, therefore, affirm that the fœtus was of the female sex, that it most probably was mature when born, and that it had apparently lain in the earth about a year, which further judicial investigation fully confirmed.

Case XV.—Drowning in a Privy.—Protracted Preservation of the Uterus.—Formation of Adipocire.

A young servant-maid, said to have been very pretty—and this very possibly gave rise to the report about to be mentioned—was seized with an inflammation in her chest, in March, 18—, and was about to be sent to the Hospital. But she strove resolutely against this, asserting that she would rather be struck dead with a hammer. On the evening of the same day, the 21st of March, she suddenly disappeared. All inquiries after her were in vain, and, of course, it was impossible to determine the truth of a report which then arose, that she was with child by her master, a married man, and her own relative, and had been made away with by him. In December of the same year, consequently about nine months subsequently, the cesspool of the house was emptied, and in doing this, the workmen unexpectedly discovered amongst the filth the completely putrefied remains of a human body. It was a most probable supposition that this was the body of the girl who had disappeared from the same house in spring, and the court was, therefore, necessitated to order a medico-legal examination of this body. I shall not likely ever again have occasion to observe a greater degree of decomposition, the very attendants on the deadhouse, well inured to such cases, were disgusted, probably for the first time, quite as much by the indescribable stench, as by the horrid appearance of the body. The skull, the lower jaw, and the greater part of the lower extremities, were by

maceration bared of their soft parts, the connecting ligaments of the joints were partly separated, and what of the soft parts still existed were but stinking unrecognisable black shreds. A regular autopsy was of course out of the question. As, however, my previous experience led me to hope to be able to reply affirmatively to the question raised by the Judge, viz.: whether it were possible yet to determine whether the deceased were pregnant at the time of her death or no? The abdominal cavity was opened for this purpose. The abdominal muscles were changed to adipocire. The whole of the intestines were transformed into a black greasy mass, in which the separate portions were no longer to be recognised. The liver, spleen, and kidneys were also changed into a similar mass. But the uterus was found of a bright-red colour, hard and firm to feel and to cut, its form perfectly recognisable and normal, its size that of a virgin uterus, its cavity unimpregnated and empty. Although, therefore, we could not give even the most problematical opinion respecting the life or death of this person, yet we could with certainty declare, that the *deceased could not have been pregnant* at the time of her death; consequently the former report, which on the finding of the body, had again been most diligently circulated, fell to nothing, and the slur of debauchery and probable murder cast upon the reputation of a hitherto irreproachable man was removed. (This certainly remarkable case affords fresh proof how in forensic medicine apparent trifles may prove to be of the most essential importance—without the knowledge of the fact of the uterus putrefying so late, and so long after all the other organs, any medical jurist might well have been excused had he in answer to any similar judicial inquiry declared his incompetence to reply, and declined even the experiment of opening the abdomen of such a *residuum* of a body.)

Case XVI.—Remains of the Body of a new-born Child.—Uterus still Preserved.

This case was most interesting in several respects. On the 7th of July, 18—, we had to examine, at Charlottenburg, the body of a new-born female child taken out of the Spree, and which must have been long in the water. The parietal bones lying on the table near the trunk were all that remained of the head. The spinal column, the left leg below the knee, all the ribs on the right side and both hands were skeletonized by aquatic animals (rats), which had also

entirely devoured the right lung. The length of the trunk was fifteen inches, its weight only 1 lb. 13 oz. The coverings of the abdomen were black from decomposition, the remains of the umbilical cord, but one inch and a-half long, was mummified; a proof that an umbilical cord once shrivelled to parchment, never becomes perfectly soft, even by lying long in water. All the abdominal organs were changed to an undistinguishable grey pultaceous mass, except the bright-red uterus, which was the only organ whose texture was still perfectly recognisable.

CHAPTER III.

DETERMINATION OF THE CAUSE OF DEATH.

§ 23. General.

Cases very frequently occur, in which the most careful examination of the body can discover no material alteration that has any reference to the cause of the individual's death. Examples of this occur, for instance, where violence has been inflicted, giving rise to general disease, proving fatal after an illness of weeks or months, long after every trace of violence has vanished from the surface of the body. They also occur to the medical jurist in those other cases, in which a report has arisen, that an individual has died a violent death, because he has been known to become ill, and die under unusual circumstances, and in whom, nevertheless, the autopsy does not reveal any facts that can be taken as proof of an unnatural death. Cases of this kind can, as I have often seen, terribly perplex the inexperienced. Nothing anormal in the surface of the body, nothing in the cranial cavity, nothing in the thorax, nothing in the abdomen! Of what did the deceased die? How shall the certificate be worded? "That the cause of N. N.'s death cannot with certainty be determined?" This decision is in itself, no doubt, perfectly indisputable; but it is plain, that it can by no means satisfy the Judge who, himself inexperienced in these matters, has summoned the medical expert to enlighten him. Who shall explain how the death occurred, when the expert declares himself incompetent? But the opinion given, displays a complete misunderstanding of the judicial object of every medico-legal autopsy. The Judge (public prosecutor) who follows the traces of every suspected or actual crime, anxious only to discover the truth concerning it, cares not to learn the sequence of the physiological and pathological phenomena and causes of the death, or to know, for instance, whether a nervous fever, or marasmus, or such like have produced it, which certainly is not often to be discovered from the inspection of the body alone, but he only

requires to know, whether the death have occurred naturally from disease (it matters not what!), or violently in an unnatural (and punishable) manner from the fault of a third party. In the former case, of course, he leaves the matter alone, and repones the reports; in the latter he follows out the matter; therefore, it is evident that a proper understanding of the object desired in the case mentioned, would have led the medical jurist to give a differently worded opinion from the foregoing—viz., the following: "That the deceased died naturally from disease, and the autopsy revealed no reason for suspecting the death to have occurred from violence." In most cases the court will be perfectly satisfied with such a certificate, always supposing it to be founded on fact. In other cases, however, the Judge, to whom all the previous circumstances are known, requires further particulars respecting the "internal disease," assumed as the cause of death, and particularly desires to know, whether this "internal, mortal disease" may not stand in direct relation to the previous violence, &c.? When the medical jurists on their part have learned what has occurred, and has been ascertained beyond the ken of their autopsy, it cannot be difficult for them to make out that connection with the "internal disease." We shall have to relate several cases of this nature subsequently.

An exception to the rule, according to which we assume the designation "internal disease" to be sufficient, is formed by those, happily rare, cases in which a want of medical skill is alleged to have occasioned or hastened the death. In such cases, of course, it is requisite most accurately to determine the diagnosis, and the stage of development of the fatal disease, by the results of dissection, as the necessary points cannot be otherwise ascertained. In these cases alone is it requisite to give a comprehensive description in the protocol of the autopsy of the pathological condition found, *e. g.*, the nature and condition of tubercles and cavities, of degenerations of the liver and kidneys, of any tumour discovered, of the degree of inflammation, of the gangrene, &c.; in all other medico-legal cases this is superfluous for the above-mentioned reasons. For the correct description of any purely pathological conditions, which have no relation to the question of death by violence, *e. g.*, the minute description of an ovarian dropsy in a woman strangled, of a Bright's disease in one shot through the head, &c., only protracts to no purpose the detention of the judicial functionaries, makes the protocol of the autopsy unnecessarily dif-

fuse, and is totally irrelevant to the subject in hand, since the dissection is, and ought to be, a *legal* and not a *clinical* one. This view is constantly maintained by the scientific commission for medical affairs in all its revisions of the medico-legal reports occurring within the monarchy, and it quite as often finds fault with the physician for losing himself without sufficient cause in a maze of diagnostic pathologico-anatomical description, as it defends him in the opposite case, where, perhaps, he may have been blamed by the medical boards.*

§ 24. Of the Kinds of Violent Death.

The cases described in the foregoing paragraphs constitute, nevertheless, on the whole, but the smallest part of those coming before the medical jurist, whilst the larger proportion is made up of those which have suffered a violent death. Death from violence may, however, occur in six different ways, and this division of the subject seems most advisable for the attainment of the practical end in view.

1. *Mechanical death.*—This occurs rapidly, generally instantaneously, when the organic "machine" is completely, or almost wholly, or only in its most important parts destroyed by mechanical violence, as happens, for example, by the sudden fall of buildings, walls, beams, masts of ships, by the crushing by sails of windmills, the wheels of machines, and the like; further, by the roasting or broiling of the body, by its being run over by carriages or railway trains, by explosions of gunpowder,† and by the squeezing of new-born children into boxes, &c.; to this category also belong most gunshot-wounds, such, for instance, as destroy the brain, heart, lungs, or spinal marrow. This mechanical death stands in opposition to all other kinds of

* The recent Prussian "Regulation," of 15th Nov., 1858 (*vid.* Part Third, p. 93) has, very properly, taken notice of this in its official directions.

† By the explosion of a manufactory of fireworks in this city (Berlin), four persons were killed. The proprietor, D—, had the whole left half of his head blown off; the rest of his body was uninjured. One workman had his skull-bones completely smashed, the entire scalp remaining perfectly *uninjured*, just as I had twice before seen it in the case of suicides where the shot had not passed through the head. D—'s wife had probably been killed by a blow from a beam; and a workman, who was ill in bed in a shed near the workshop, was blown to a distance of a hundred feet, bed and altogether. The body of this man was quite unrecognisable, the back of the head torn off, and every limb smashed in pieces. The shed and the workshop (a small house in a garden) had entirely vanished.

death, which may in this respect be classed under one head as *dynamical*. But these dynamical deaths may be judiciously, and agreeably to nature, still further subdivided into the following varieties:—

2. *Neuroparalytic death.*—This is the direct opposite of the mechanical death, and evinces itself as such by its effects on the body. In neuroparalytic death (*Apoplexia nervosa*), not only is the mechanism of the body in no way altered, but there is also no perceptible change in its fluids or solids. The results of the dissection are purely negative; and this kind of death is arrived at, as it were, *per viam exclusionis*, without being able positively to demonstrate it. It is of frequent occurrence in cases of drowning and hanging.

3. *Inflammatory death.*—In this case the inflammation of any important organ, with its results, suppuration, exudation, or gangrene, puts an end to life. Death occurs thus after most injuries of the brain, lungs, liver, intestines, diaphragm, &c., after the exhibition of corrosive poisons, and not rarely after extensive burns.

4. *Hyperæmic death.*—Death from excessive congestion of the important central organs, either (*a*) of the cranial cavity (*Apoplexia sanguinea*), in which the fatal compression of the brain may be brought about, either by simple engorgement of the vessels, or by actual hæmorrhage from them (*Hæmorrhagia cerebri*); or (*b*) by sanguineous congestion in the thorax, in the lungs, large blood-vessels and heart; death consequently from thoracic apoplexy, effusion into the bronchi, or asphyxia. The first species, occurs after many injuries of the head, frequently after hanging (strangulation or suffocation), after poisoning with narcotic poisons, after excessive general violence; after exposure to excessive cold, and occasionally after drowning. Death from asphyxia is, on the contrary, the most usual form after drowning, and after occlusion of the air-passages with foreign bodies; occurs also often after hanging and suffocation; kills the most of those who are smothered by any means whatever; also those who die from fire (and smoke), and finally, those that find their death in irrespirable gases. Both kinds of hyperæmia are often found in the same body, a circumstance easily explicable on well-known anatomical grounds.

5. *Anæmic death.*—Death from so important a diminution of the sanguineous contents of the body, that the whole œconomy succumbs beneath it. To this category belong all deaths from hæmorrhage,

external as well as internal, whatever may have been their source, also death from exhaustion and starvation.

6. *Dysæmic death.*—It is perfectly incontrovertible, that death from vitiation of the blood (blood-poisoning) does exist. The microscope and test-tube make this patent to all, though truly the actual autopsy of the body on the dissecting-table, only occasionally permits it to be suspected from some peculiar anormal quality of the blood, which, moreover, may easily prove deceptive. A host of poisons kill only by poisoning the blood, particularly the chronic ingestion of arsenic, prussic acid, alcohol, probably most of the alkaloids, certainly phosphorus, according to my observations, subsequently to be detailed (§ 34, Special Division), and possibly many more poisons than it can as yet be positively affirmed of. To this class of death from dysæmia belong also those cases in which severe injuries, followed by illness and operative interference, destroy life by pyæmia.

It need scarcely be said, that this classification of the various species of deaths has no pretensions to be a strictly logical one. Such it is impossible to construct, because very frequently the results of several kinds of death are found united in one individual object of examination, *e. g.*, mechanical laceration and hæmorrhage following gunshot-wounds, mechanical destruction and suffocation in the case of those buried alive, the results of inflammation and dysæmia subsequent to injuries, &c. But the necessity for a determinate classification of the results of the autopsy according to general categories, makes itself daily more felt by the medical jurist, and those now propounded have at least the merit of practical utility.

PART SECOND.

PERIOD OF THE EXAMINATION OF THE BODY.

Statutory Regulations.

REGULATIONS FOR THE PROCEDURE IN THE MEDICO-LEGAL EXAMINATION OF HUMAN BODIES, OF DATE 15TH NOVEMBER, 1858.

§ 3. *No medico-legal autopsy shall be proceeded with previous to the lapse of 24 hours from the death, provided that the time when that occurred is known. The body may, however, be inspected at an earlier period.*

§ 4. *Medical men are not usually to decline, or omit to perform an autopsy on account of the existence of decomposition. For even at a very advanced stage of putrescence, anormalities, and injuries of the bones may yet be ascertained, foreign bodies discovered, pregnancy, &c., detected, and many kinds of poisoning may yet be proved. Where, therefore, it may be necessary to disinter a body for the purpose of determining any such questions, medical men are to decide upon its propriety without any reference to the period elapsed since the death.*

§ 25. SUITABLE AND UNSUITABLE TIME.

In every autopsy, but specially in every autopsy undertaken for forensic purposes, it is greatly to be desired, that the forensic physician should be enabled by the legal authorities to undertake the examination as soon after death as possible, before any of those various *post-mortem* phenomena already described can occur to obscure facts, or to render their establishment impossible, as may only too readily be the case where putrescence has already set in. The statutory regulations already quoted, have very properly fixed twenty-four hours after the death as the earliest period for the performance of the autopsy, because within this time the body is found to present trustworthy signs of death (*Vid.* § 7, &c.), and there is, therefore, no longer any risk of finding on the dissecting-

table one not really dead. Most medico-legal dissections are, nevertheless, made at a much later period, as may be easily understood from the nature of the circumstances. Sometimes the corpse is first discovered at a late period, at others, the official procedure before the law authorities has delayed the appointment of the period for the autopsy, sometimes considerable time is required to transport the body to the locality where it is to be examined, at others, the witnesses necessary to identify it cannot be brought forward so early, &c. Nevertheless, it is certain, that from twenty-four to thirty-six hours after the death is the fittest time for the examination of the body. But the medical jurist must also be prepared to examine the body even at an unfit time, because the laws direct him to do so, and because in the cases referred to by them, some practical result may be probably expected; he will not, therefore, shun this often most unpleasant business, nor seek by false pretexts to induce the Judge to desist from requiring it, if the consciousness of the importance of his vocation fills his breast, and the scientific interest of the profession to which he belongs, burns within him. Medico-legal autopsies take place at unsuitable times when they are performed under the following circumstances: 1. in advanced putrescency; 2. after a preceding private autopsy; 3. in the case of bodies or fragments of bodies disinterred. Under these circumstances the autopsy may be termed late, and this topic we shall now consider.

§ 26. Late Autopsy.—*a.* In a Putrid State of the Body.

The regulations in § 4 of the New Code, comprise almost all the cases in which successful results are attainable in the examination of perfectly putrefied bodies. It is true, that "anormalties (*e. g.*, excess or defect) of the bones, injuries of them" (*e. g.*, fractures, gunshot-wounds, &c.), or "foreign bodies," as balls, points of knives, &c., may be discovered; "pregnancy" may be detected, where it was present at the time of death, or where it was only suspected it may be proved not to have existed, of which the case (XV.) already given affords evidence, and many kinds of poisoning, that is not only "arsenical," but most probably also, every other kind of metallic poisoning * may be proved. But, also, the important question of live-birth may possibly be settled even by the data afforded by the

* *Vid.* Case XXV., in which we discovered mercury in a body that had lain buried for six months and a-half.

putrid body of the child. For the consideration of this, *Vid.* § 106, further on. Indicative facts may be furnished, and even at a late period the condition of the bones may furnish presumptive proof of the maturity or immaturity, of a new-born child, as for example, is shown by the case (XXIX.), afterwards to be given. Finally, parts which resist putrefaction, as the hair and teeth, must be submitted to inspection, for the purpose of establishing the identity of the body in important criminal cases, and of the importance of this the case (XXXI.) given below, affords the most remarkable proof.

Case XVII.—Determination of the Nature of the Death in a perfectly Putrefied Body.

The following very peculiar case is exceedingly instructive, in regard to the necessity of never refraining from examining a body on account of its advanced state of decomposition. During the unusual heat in August, of 25° R. (88° F.) in the year 185—, a well-clad man was found lying dead just outside the town. He had silk gloves on his hands, and in the right one held a pocket-handkerchief, upon which there were said to be stains of blood. Near the body there lay a small, old, blunt, and worthless single-bladed knife, not likely to have belonged to such a well-clad man, and upon which also stains of blood were said to have been found, and these circumstances occasioned the necessity for a medico-legal examination of the body. The corpse was already blackish-green, the cuticle peeled off, and myriads of maggots covered the body; the brain ran out, &c. But in spite of the general anæmia from putrescence, it could still be distinctly made out that the deceased had died from apoplexy of the heart, since the right side of the heart and the pulmonary artery were still distended with a putrefying pultaceous mass of half fluid, half coagulated blood. Moreover, the entire absence of any wound in the body, perfectly justified the opinion, that the knife had not been the cause of death, while the autopsy also did not discover any other external cause as the active agent in producing the death; and upon these explanations the further prosecution of the case was dropped.

§ 27. Continuation.—*b.* After the Completion of an Autopsy elsewhere.

Cases occasionally occur in which the body, being brought to the

medico-legal dissecting-table has not only had all its cavities, but even all its organs laid open, partly from precipitation, and partly because the wounded person had died in an Hospital, where it was not known at the time of death that the case would come under the cognizance of the law, &c. In such cases it may happen, that the medical jurist can no longer determine the nature of the death, but this possibility can never be accepted as a sufficient reason for at once declining the task. For there are injuries, which leave indelible traces of their fatal effects, so that even a second dissection may afford certain proof of the cause of the death, and in other cases, where this certainty may be unattainable, yet a more or less probable opinion may be given to the Judge, to serve as a basis for the further conduct of the case, of which he would be entirely destitute should the medical jurist have declined the task on the score of incompetence. That the latter must be specially careful in forming his judgment in such cases, is self-evident; general rules cannot, however, be given, each case must stand upon its own footing.

Case XVIII.—Injury of the Head in a Body already dissected.

A builder, by the breaking of a rope, met with a severe injury to his head from an iron bolt. He was sent to an Hospital, there treated, and after his death dissected, before the law could step in. We found the cranial cavity empty, and the brain cut up and stuffed into the abdomen. But at the *basis cranii* several parts of the sphenoid, ethnoid, and of the orbital portion of the frontal bone were found broken off, and, accordingly, presupposing that these fractures had been caused by the injury in question, we could upon this basis build a most probable opinion. Had the case gone further, which it did not, and had a report of the autopsy been required, along with which the history of the case from the Hospital records would have been laid before us, in spite of the previous dissection, the case, as no one can doubt, might have been decided with the utmost certainty.

Case XIX.—Rupture of the Liver and Fracture of the Ribs in a Body already dissected.

A workman had been driven over and killed. His body had been dissected by a private physician, and it was brought before us in the

following condition:—The head remained unopened; the thorax and abdomen had been stitched up in the usual manner after the section. Near the body lay a liver, which was divided into two parts by a longitudinal tear down the middle. The stomach and intestines had been ligatured and removed (for what purpose, it was impossible to say), and lay now free in the abdominal cavity. In the thorax the lungs and heart were both drained of blood, and much cut up. The brain was normal. Any effusion of blood into the abdominal cavity could no longer be recognised. Besides the rupture of the liver, which, as is so often (*Vid.* § 33, Gen. Div.) the case, was betrayed by no external mark of violence, there also existed a fracture of four ribs. We gave it as our opinion, that if the liver shown to us was that of the deceased (which the Judge could easily ascertain by interrogating the witnesses, and did so ascertain), and if the rupture took place during life,—both of which seemed from the circumstances highly probable,—then no doubt could be entertained as to the necessarily fatal character of the injury.

Case XX.—Gunshot-Wound of the Axillary Artery in a Body already dissected.

On the 10th of February, 1851, the boy K., aged three, was playing with a short musket, which, as was afterwards ascertained, had been loaded since the year 1848. The gun went off, the shot taking effect in the right axilla. The boy was immediately taken to the Hospital, and died there on the 19th of the month. On the 22nd the body, which had been already opened at the Hospital, was brought before us for official examination. Three and a-half inches of the right axillary artery were wanting. The clinical assistant being present, displayed this portion of the artery, which had been cut out by himself after the boy's death; in the middle of it there was a ligature of red thread, and about a quarter of an inch from it, an opening the size of a pinhead in the artery. In the axillary region there were, close to one another, three circular openings, two to four lines in diameter, with sharp, smooth, and dry edges, which penetrated the dermoid tissues. One inch beneath these there was a wound an inch long, with sharp edges (wound of operation), which penetrated into the muscles. The lungs and the heart were much cut up, but exhibited an unwonted paleness. On the fourth rib of the right side the bone felt rough externally, and internally, the vessels were dis-

tinctly injected. The liver, spleen, and kidneys were cut up, and also exceedingly pale. The *vena cava* was almost empty. The cranial cavity alone had not been opened. The meningeal vessels were pale and almost empty of blood. The sinuses were completely empty of blood, the brain itself only very pale. Under these peculiar circumstances, we could have no hesitation in stating:—1, that the deceased died from internal hæmorrhage; 2, that this arose from the injury to the right axillary artery; and 3, whereby it came under the cognizance of the then penal code: that this injury had been the necessary cause of death. In this case, consequently, the previous private autopsy had no influence whatever over the opinion formed by the medical jurists.

CASE XXI.—INJURY OF THE HEAD IN A BODY ALREADY DISSECTED.

A five-years old boy was struck on the head by a washing-basin; he was carried to an Hospital for treatment, and there died, and was dissected. On the right side of the forehead there was a horizontal wound about an inch and a-half long, already half healed, its edges kept together by stitches. At this point, a triangular portion of the frontal bone had been sawn out. The brain was cut to pieces, but it had evidently been covered with purulent matter. The inferior portion of the skull was uninjured. All the thoracic and abdominal organs were completely cut up, We could, therefore, state summarily as our opinion: 1, that the boy had died from suppuration of the brain, and 2, that it might be assumed as in the highest degree probable, that this had been the result of the injury received.*

§ 28. CONTINUATION.—*c.* ON DISINTERRED BODIES AND FRAGMENTS OF BODIES.

Statutory Regulations.

PENAL CODE, § 46.—*Offences punishable with death, fall under the statute of limitation after* THIRTY *years; offences punishable with deprivation of liberty for more than ten years, come under the same statute after* TWENTY *years; offences punishable with deprivation of*

* *Vid.* also Cases XXIII. and XXXI., as examples of the examination of bodies already dissected and buried.

liberty for a shorter period, are equally excluded from punishment after the lapse of TEN *years.*

Offences punishable with imprisonment for a longer period than three months fall under prescription in FIVE *years; other crimes in* THREE *years.*

The time necessary to complete the prescription is reckoned from the day on which the crime or offence was committed.

The cases in which the exhumation of a body may be hoped to be practically useful in furthering the ends of justice, have already been detailed in § 26. The rule in such cases, according to my experience, is for the law authorities, induced by the circumstances of the case, of themselves to give orders for this proceeding. Of course this order is never given after the lapse of the time necessary to allow the supposed crime to fall under prescription, that is, according to the regulations of the penal code quoted above after twenty, or at the most, after thirty years. But almost all those objects already enumerated as subjects for such an investigation, such as peculiarities of the bones, and therefore pregnancy, and the determination of the probable degree of maturity of a fœtus, peculiarities of the hair, foreign bodies, and many kinds of poisoning, can possibly after twenty, and even after thirty years, be so ascertained by examination of the disinterred remains, as that some opinion regarding them may be formed; such at least may be expected to be the case. If, therefore, a medical jurist should be consulted as to the expediency of any exhumation, he must reply affirmatively, if the case involve any of those contingencies we have just enumerated. In such cases, the presence and personal assistance of the medical jurist at the disinterment will be of the greatest utility, because after the lapse of some time the coffin is generally decayed, and the position of the body in it may by carriage be so altered as to interfere unfavourably with the subsequent critical examination. Further, in cases of suspected poisoning by arsenic, earth from the neighbourhood of the coffin, or fluids escaped from the body and found in the coffin, &c., must be collected, and this of course can only be properly done by the medical jurist himself, or under his personal superintendence. On the other hand, it must be remembered, that an exhumation absorbs a great deal of time, and of money too, either from the party concerned or the exchequer, and therefore it is to be advised against in every case where it is unlikely to be productive of any useful result (Case CLXIV.). This is particularly the case where doubts respecting any

fatal internal ailment are proposed to be settled by the exhumation of a body already buried for weeks or months, or where any doubt is proposed to be solved by reference to some peculiarity in the soft parts of such a body. As to the bones,—again to return to them,—it is well-known for how long a period after death they remain recognisable. The bones of King Dagobert were well preserved when dug up in the Church of St. Denis, where they had been buried for twelve hundred years (Orfila). Haller supposed he had procured gelatine from the bones of a mummy two thousand years old, and Orfila confirmed this in so far as that he procured 27 per cent. of gelatine by boiling bones six hundred years old. I myself possess the ulna of an adult, which I saw dug up at Pompeii in August, 1844, and which must, therefore, have been buried in its ashes somewhat less than eighteen hundred years; and it is so completely preserved that an anatomical demonstration might be given on it. All such curiosities are in so far of practical value, that they teach us that bones *exhumed within the longest prescriptive period (thirty years) are yet capable of affording conclusive information.* This is particularly the case with the skull bones, all the long bones, and the almost indestructible teeth, while the more spongy bones, as the vertebræ, are decomposed earlier. My own experience is not sufficient to enable me to say more respecting the gradual alterations which the bones undergo during the first thirty years after death—the only period of practical importance—and I must, therefore, refer to the various authors upon this subject, whose observations, nevertheless (resting on personal observation ? ?) contain the greatest contradictions, and must be received with caution.*

In proof of what I have said, I append the following cases of the exhumation of bodies, or parts of bodies.

Case XXII.—Exhumation of the Body after three weeks to ascertain the existence of Membranous Croup.

A three-years old boy was lost by his parents in the open country, and three days afterwards found dead, and buried. Three weeks later, on the 21st of July (why? is to me unknown), the body was exhumed for the purpose of ascertaining if he had died of croup (!).

* *Vid.* Kanzler's exquisite treatise on Medico-legal Skeleto-necropsie, in Casper's Vierteljschft, Bd. v. s. 206; and particularly in Bd. vi. s. 121 and s. 202, and Bd. viii. s. 44.

The entire countenance, scalp, dermoid coverings of the neck, and its muscles were destroyed by thousands of maggots. The whole body was covered with mould (fungi). No external injuries were discoverable. The brain had disappeared, and the *dura mater* lay like an empty bag in the cranial cavity. The soft parts of the fauces were quite destroyed, and the cavity filled with putrid fluid, and thousands of maggots. Larynx and trachea were already devoured, and their mucous membrane dissolved in a bloody ichor. There was no trace of membranous exudation. The lungs were quite putrid, the heart flabby and shrivelled, the stomach, spleen, kidneys, and liver already in a more or less advanced stage of putrefaction. The decision naturally arrived at was, that whether the child had died of *croup* or no, could neither be decided with certainty nor probability.

Case XXIII.—Exhumation after twenty-three Days, for the purpose of determining Death by Arsenical Poisoning.

The wife of a physician had raised an action of divorce against her husband, who was ordered to repay her dowry of 12,000 dollars (£1,800). On the evening of the 8th of May, while the case was yet under appeal, the family ate a herring salad. The wife who ate alone in a back chamber, had her portion sent her by her husband. All the family remained unaffected; the wife, however, was seized with vomiting during the night, which lasted four days, and cut her off on the 12th of May. Her husband allowed her to be opened by a surgeon, a friend of his own, who was struck by the quantity of eau de Cologne the husband poured into her abdomen at the time of the autopsy. The body was buried, but after the suspicion of poisoning had arisen it was disinterred, and brought to us for medico-legal examination, on the 4th of June, three-and-twenty days after the death. The body presented (after three weeks) on most parts the usual *post-mortem* discoloration; on the trunk and superior extremities alone numerous green and excoriated patches were visible. The posterior wall of the stomach was uniformly stained of a dusky-red, manifestly from hypostasis; interiorly the mucous membrane was elevated by numerous bullæ, caused by decomposition, but neither granular nor crystalline particles, nor inflammation, nor effusions of blood, nor grangrene, nor perforation, were discoverable. In the rest of the body nothing anormal could be detected. The œsophagus,

the stomach, the duodenum, and also the blood and urine from the corpse were subjected to careful chemical examination, directed of course to the detection of metallic poisons, particularly of arsenic, inasmuch, as there was no reason for suspecting the existence of any organic poison. None of these viscera, however, nor the blood, nor the urine, gave any traces of any metallic poison, particularly of arsenious acid, and as the results of autopsy were also perfectly negative, we were constrained to declare, that the suspicion of poisoning had not been confirmed by any material proof. The circumstances under which the death occurred were, nevertheless, very striking.

Case XXIV.—Exhumation after Twenty Days. Fracture of Ribs, etc. Pleuritis.

This case could be perfectly explained three weeks after death. It was that of a woman, aged 80 years, who was driven over, and died in the Hospital after six days. The body was still (in February) tolerably fresh, only the abdomen was already dark-green, the cuticle abraded, and the colour of the eyes no longer recognisable. In the absence of any other important cranial injuries, the scalp wounds, which could be seen to have been artificially enlarged, could not be regarded as the cause of death, any more than a transverse fracture of the cheek-bone could be. But we found five ribs on the left side (the third to the seventh inclusive) transversely and doubly fractured, with tolerably smooth edges, and we found "the distinct traces of an ecchymosis of the soft parts covering these ribs," and also that the pleura of the left side was "distinctly much redder" than that of the right side. In the left pleural cavity there were eight ounces of bloody fluid, and none in the right one, this circumstance being opposed to the idea of the effusion being merely a cadaveric phenomenon. Both lungs were connected to the ribs by soft and purulent adhesions, which could be easily torn, and were, therefore, of recent formation—on the superior lobe of the right lung there was a small blood coagulum the size of a two-shilling piece. It was, therefore, easy to decide that the woman had had her ribs fractured by the accident, and this had given rise to fatal pleuritis.

CASE XXV.—EXHUMATION AFTER FIVE MONTHS AND A-HALF, FOR THE PURPOSE OF DETERMINING THE EXISTENCE OF POISONING BY ARSENIC.

On the 24th of January, 18—, the widow F. died at a country-house belonging to B., where she was on a visit. The latter had given the deceased—already 55 years old—a promise of marriage, on the strength of which he had received possession of her somewhat considerable property, but he had speedily drawn back, and the repeated requests of F., either to consummate the marriage or return her goods, were of no avail. At this time F. died, as we shall see, under very suspicious circumstances. Soon after her death B. sold the property, and removed to a distant province. Reasons for suspecting him and his housekeeper, U., who was pregnant by him, of being accessory to the death of F. gradually accumulated, and it was thought necessary to exhume her body, which exhumation we were required to attend. We assisted at the whole of the tedious and difficult proceeding, which was undertaken on the 10th of July, *consequently just five months and a-half after the death of F.* We have extracted the following more important passages from the protocol, and subsequent report of the autopsy:—The body was completely clothed; on attempting to unclothe it, this was found impossible with respect to the upper extremities, the hands covered with gloves, and the legs and feet clad in shoes and stockings. The clothing was covered with mould and innumerable maggots. The body emitted (as usual) not so much a smell of putrefaction as one of old cheese. The head, whose features were still so distinct as to be recognised by old acquaintances, was covered by a hood, which also could not be removed. The countenance of the woman, said to be fifty-five years old, was of a dark-grey colour, dry and leathery, mummified. The eyeballs were wanting, and also the nasal cartilages; the tongue lay behind her imperfect teeth. The ears were well preserved, and in both were golden earrings. The plumpness of the body and roundness of the limbs were completely preserved. All the anterior part of the body was of a red brownish-yellow, and had the exact appearance of burnt portions of skin after death. The skin cut leathery. The posterior surface of the body was of a somewhat brighter-red, but even here the skin was leathery. The natural cavities were free of foreign bodies. The neck was in the same

condition as the face, and no mark of injury or of strangulation was perceptible. In the abdomen the intestines preserved their natural situation. The external fat, which was plentiful, was hard, but well preserved. The peritoneum everywhere displayed its usual pale colour. The omenta were loaded with fat. The liver was very small and of a steel-grey colour, the gall-bladder quite full. The stomach was of the usual size, quite empty and collapsed, felt soft and greasy, and had a greenish-brown appearance. After being properly ligatured it was removed and opened; its mucous membrane was of a darkish-grey, and completely free from ulcerations or other anormalities. The stomach and a piece of the liver were set aside for chemical examination. The intestines were of a pale-greyish colour, and perfectly empty. The kidneys and spleen were softened by decomposition, the urinary bladder was empty, the uterus, firm and bright-red, was quite empty, as were also all the large venous trunks. The lungs lay free in the thorax, were of the usual colour, and empty of blood. The heart was flabby, collapsed, and perfectly empty. Trachea and larynx were empty, their mucous membrane of a brownish-red colour. The œsophagus was empty, and displayed nothing anormal. It was also removed for chemical examination. After the removal of the skull-bones, the brain was found so much decomposed as to be almost all run out.

The chemical analysis, which was prosecuted with the utmost care, proved indubitably the entire absence of every arsenical compound in all the parts of the body examined, and also the absence of every other injurious metal, with the exception of a very small portion of a mercurial compound.

In our report of the inspection we have said, "Nothing certain is to be ascertained from the official documents respecting the circumstances preceding the death. The entire history of the disease is wanting, an omission which is not compensated for by the minutes of the examination of the physician in attendance—the village surgeon (!) S. The circumstances brought to light are certainly fitted to give rise to the suspicion of poisoning. At the commencement of her illness, acquaintances of F. who came to B. to visit her, were attempted to be put off by the housekeeper with the information, that neither F. nor B. were at home, and not succeeding with this, she declared the doctor had forbid any one to see the sick person, which he denied. Admitted at last, her friends found her lying in a dark room, which the housekeeper was with difficulty

prevailed on somewhat to enlighten. F. was disgusted with wine, and shuddered when her friends tried to persuade her to take some of that standing by her. Formerly always known as 'fresh and healthy,' she now complained of pains in the neck, violent heats, soreness of the mouth, frightful pain in the stomach, and constant vomiting. B. had ordered her excrements to be so disposed of, that no animal should get at them to eat them! The cook deponed, that towards the end of the illness, the housekeeper had with her own hands made ready all the food for the sick person, and poured the physic into the soup after she had positively refused to take any more. The cook also depones to have heard such expressions as—'As soon as the devil shall have carried off the old one.' Whilst both the accused complain of the deceased's intemperance in eating, and particularly in drinking, and ascribe to this her fatal illness, all her former acquaintances declare, that F. was always exceedingly temperate. The unusual haste with which B. conducted the funeral was also remarkable, and still more remarkable that he, when apprehended at the commencement of the preliminary proceeding, should have hanged himself in prison!" After explaining at some length, that all these circumstances afford of themselves no ground for a medico-legal opinion, the report goes on to say:—"At the commencement of the Christmas holidays there was a dinner at B.'s, at which, according to both the accused, the deceased F. ate most voraciously, and also drank largely both of white and Hungarian wines. Soon after the conclusion of the meal she commenced to vomit, continued to complain for a few days, but was soon restored to health. In the middle of January, however, she sickened again. She complained of rigors, pains in the neck, and constipation, she coughed and was feverish; two days after this, the use of diaphoretics and purgatives had quite restored her, so that the surgeon in attendance says, he ordered her nothing more,—a statement at variance with the dates of his prescriptions. On the day of F.'s death, he says he saw her again. 'I found,' he says, 'the state of her health still in a gastric condition, or rather, I found it once more gastric.' This is all this 'physician' (!) has to say of this dying person—for F. shortly after died. In striking contrast with this is the deposition of the cook—'On the morning of her death, she complained of frightful pain in her belly, a constant burning, which made her drink cold water. She died suddenly in full consciousness. Her last evacuations were greenish and watery.' This witness also

depones to having seen 'ulcers and sore places' in the mouth of F. during her illness. Any opinion as to the disease of which F. died, founded on these few and superficial data, must of necessity amount only to a probability or suspicion. There is no doubt, but that symptoms are specified which do occur after poisoning with corrosive poisons, such as arsenic and sublimate, particularly the frequent vomiting, the feeling of weight in the stomach, the 'fearful pain,' the 'continual burning in the belly, and the sores alluded to, as having been seen in the mouth;' on the contrary, the circumstance that the vomiting was observed in the first illness, and the pain in the belly in the second; further, and quite particularly, the fact, that the death was sudden and attended by perfect consciousness up to the last moment, all militate against the supposition of poisoning; and this all the more, that all the symptoms stated as occurring in this case, are also peculiar to other diseases. It follows from this, that the phenomena observed during the illness of F., do not by any means permit the assumption of the administration of poison being made out with that certainty which the law requires.* And just as little is this to be made out from the results of the autopsy. It is of course a source of regret, that this has only been performed after the lapse of half a year from the time of death, when the putrefactive process has already had time to destroy, more or less, all the organs of the body. Still, even after a much longer time, in cases of true arsenical poisoning, exhumations, and dissections, have been attended with probative results," &c. (Here follows details respecting the mummification of such bodies). "Now it is true, that a certain amount of mummification was observed in the body of F., as we have already described; but it would be rash indeed to conclude from this appearance, that arsenical poisoning had indeed taken place. For mummification has been often enough observed in bodies, where arsenical poisoning could not for one instant be supposed to exist, where the soil or the vault in which the body was buried or placed, possessed certain peculiar, not yet sufficiently known conditions, which favour the occurrence of this process. Whether this is the case with the soil of the churchyard at B. is, of course, not known to us, and it is doubtful, whether *cæt. par.* other bodies buried there would not exhibit similar phenomena on being exhumed? No other

* The old penal code (A. L. R., Thl. ii. Tit. 20, s. 858), which required certainty of proof as to the administration of the poison, but only probability as to the fatal issue.

symptoms indicative of poisoning by arsenic, or any other corrosive poison were observed. Accordingly the results of the dissection give no certain reasons for entertaining the supposition of arsenical or any other corrosive poisoning. And just as little proof of this is afforded by the results of the chemical analysis. Our report of July 30th, under the head *c.*, affords convincing proof of the non-existence of any arsenical compound, which can be at once recognised in the most minute quantities, but it points to the existence in the body of a very small quantity of a mercurial compound. So minute a quantity cannot, however, be looked upon as 'poison,' especially as deadly poison, considering that mercurials are daily given as medicines in much larger quantities than we here discovered. This discovery is, however, so far remarkable, that the surgeon, S., denied having ever given the deceased any mercurial, and none such were found in his prescriptions. But consider how often patients take physic unknown to their doctors, and had F. only taken a few ordinary laxative pills containing mercury, a most natural explanation would be afforded of the results of the chemical analysis of the body. We may, therefore, leave undetermined the question, whether the woman had formerly been syphilitic, which the official documents give some reason to suppose, and whether she might not have been treated for this with mercury, seeing that it has been sufficiently proved, that the small quantity of mercury found could not be regarded as deadly poison." Accordingly, we gave it as our opinion, "that from a medico-legal point of view it could not be ascertained that poison had been *administered* to F., and, therefore, the further question—whether it could with probability be ascertained that her death had been the result of poison?—fell to the ground."*

CASE XXVI.—EXHUMATION AFTER NINE MONTHS.—FRACTURE OF THE CRANIAL BONES.—FORMATION OF ADIPOCIRE.—MUMMIFICATION.

A boy, aged four years, was said to have been killed by the leaf of a door falling upon him, and was buried. At the disinterment,

* I have quoted this case, as all others, exactly as it occurred at the time (and that a long time ago); but I must remark that, since then, I have been taught by a numerous series of observations on poisonings, cadaveric processes, and the volatilization of arsenious acid, and should such a case now come before me, I would no longer stand by the above, which are yet the *common* opinions, but am prepared to go a great way *in advance*, as I shall more distinctly explain in the chapter on poisonings (§ 28, Special Div.).

the features of the corpse were found to be perfectly unrecognisable, the whole body of dirty, blackish-brown colour, covered with mould, emitting a fusty odour, and tolerably stiff and immoveable, in many parts, particularly over the whole superior extremities, and on the face the surface was distinctly mummified, that is, it cut like wood, and was of a deep, dirty-brown colour. The internal surface of the scalp was already partially converted into adipocire; the lambdoidal suture on the right side was separated to the extent of two lines, the occipital bone fractured to the extent of two inches, the entire brain collapsed, lying loose within its membranes, and changed to a grey pultaceous mass; the *basis cranii* was completely split across by a fracture which extended from the right petrous portion of the temporal bone to the left one, right through the *sella turcica*. The lungs lay shrunk up in the posterior part of the pleural cavities; they were greyish-black, and perfectly anæmic, as was also the whitish-grey heart, the texture of which was still perfectly recognisable. The trachea and œsophagus were converted into adipocire. Some dried-up remants of food lay in the still distinguishable stomach. The omenta and mesenteries were converted into adipocire; the liver and the spleen were whitish-grey, empty of blood, and floated in water; the kidneys were transformed into an adipocire-like substance, as were also the intestines, which were all lumped together; the urinary bladder and the *vena cava* were quite empty.

The cranial injuries, which, from their nature and extent, *could not have been produced after death* (*Vid.* § 6, Spec. Div.), led to the conclusion that the head of the child had been struck with great violence, and that the very considerable injuries to the skull which had thence resulted had caused its death.

Case XXVII.—Exhumation of the Remains of a Child after Two Years, in order to determine the fact of Poisoning by Arsenic.

In this case, I was consulted by the public prosecutor of a foreign state, whether I would consider that the exhumation of three children, supposed to have been poisoned by their mother twelve, eight, and two years previously, could be of any practical utility, for if I thought so the exhumation would be carried out. I proposed to proceed with the disinterment of the body of the child that died last (two years previously), and to wait the result of its examination before

proceeding to disinter the other two. Three months afterwards, the remains of this body were sent to us, along with earth from the grave, &c. The body, according to the protocol sent with it, had been taken out of the coffin, which was still extant in the grave, by the hands of the official physician in that district, and placed by him in a jar. The shavings had also been removed from the coffin and packed in a box, in which a portion of the wood of the coffin and some of the earth next it had also been placed. The district physician explained in his protocol that "the body was that of a child only a few weeks old. It was so far recognisable that the cranial vault still preserved its form; it was, however, so thin and brittle that it fell to pieces on being touched. The bones at the base of the skull, the vertebræ, and the rest of the bones, seemed to preserve tolerably accurately their proper position, but all the ligaments and other soft parts were already completely decayed away. The feet and hands could be no longer recognised, nor any article of clothing distinguished." In conjunction with our sworn expert, apothecary Schacht, I next proceeded to open the jar, and in it we found a mass of brown shavings, the remains of a few bones and of a skull, and a human-like brownish-black mass, which we took to be the remains of the putrefied soft parts and softer bones. These matters were submitted, singly, to the most careful analysis, with the view of discovering the possible presence of lead, copper, mercury, bismuth, antimony, or arsenic, and the result obtained was that the remains of the body and the shavings in the pot contained not the smallest trace of arsenic, but that in both there was a mere trace of oxide of copper. "This fact," we stated in our report, "cannot be regarded as proof of the child having been poisoned with any preparation of copper (as verdigris, &c.). For, besides the fact that a portion of the shavings surrounding the remains must have been included in making the analysis; that further, it was probably buried clad in woollen or linen cloths, and that it has been proved by the investigations of Sarzeau, John, Meissner, &c., that copper exists normally in vegetable matters; the recent researches of Wackenroeder (Archiv. der Pharmacie, October, 1853) have proved beyond a doubt that traces of copper are often to be found in human blood." Under these circumstances, we did not proceed to examine the contents of the box till further inquiries should be made; this examination was never required, and the other two bodies were never exhumed.

Case XXVIII.—The Disinterment of a few Bones.

In March, 18—, several human bones were given to me by the public prosecutor with a request to state, after inspecting them—how long they had been buried, and whether traces of the perpetration of any crime could be found on them? In my short report I replied, that I had examined the bones in question: "they consisted of the skull and bones of the upper and lower extremities of a human being. The individual to whom they belonged must have been between twenty and thirty years of age when he died. No traces of the perpetration of any crime were to be found on the bones, which were all, particularly the skull, quite uninjured. The yellow colour and weather-beaten condition of the bones led to the conclusion that they have been for many years lying in the earth, though it is not possible to state exactly how many. Yet I think I do not err in stating that they must have been buried for a period longer than sufficient to permit even the most serious crime to fall under prescription." This opinion satisfied the public prosecutor, and the case was allowed to drop.

Case XXIX.—Exhumation of a New-born Child.—Formation of Adipocire.

The bones of a child were dug up in a garden at Charlottenburg, and brought to me for examination, and the answer to the following questions, "whether the bones and other matters found belonged to the body of a new-born child that had been born alive, or how old the child might have been, and about how long a time had elapsed since the death of the child?" The matters in question consisted of a coarse linen rag, much corroded by the lime found about it, in a quantity of yellowish-white, greasy *adipocire*, which melted at the flame of a candle, and in which several bones, particularly the thigh bones, the frontal bone, the ileum, and lower jaw were more or less enveloped, and of several other bones, which had to be carefully picked out of a mass of sand, lime, rags, and adipocire. These bones were—1. A parietal bone, split into three, its greatest measurements being three inches and a-half long, by two inches and three-quarters broad; 2. The greater part of an occipital bone, with a well-marked external tuberosity, measuring from base to ver-

tex two inches and three-eighths, and two inches and a-half in breadth; 3. a halfmoon-shaped fragment of a parietal bone, two inches long by two inches and a-half broad, to which a few light-coloured hairs adhered; 4. a frontal bone with a well-developed frontal eminence, from the orbital process to the upper edge it was two inches high, the breadth was the same; 5. two bones of the lower jaw, each half was two inches long, their breadth in the middle three-eighths of an inch; 6. a shapeless thin, flat little piece of bone, probably belonging to the ethmoid; 7. two upper jawbones, thirteen lines broad and eleven lines high; 8. a tattered shred, the thickness of post paper, about two inches and a-half long by one to one inch and a-half broad, manifestly belonging to the aponeurosis of the scalp, and distinctly covered with fair hair about three-quarters of an inch long; 9. five fragments of vertebræ, three of which possessed distinct spinous processes; the bodies of these could be cut with a sharp knife, displaying the spongy texture quite distinct; 10. a considerable mass of adipocire, out of which both the ilea were unrolled; these were both well preserved, fifteen lines high and seventeen lines broad; 11. a brownish-yellow greasy mass spread upon a thin membrane, enveloped in a lump of adipocire and lying near the ilea, the peculiar smell of which at once distinguished it as meconium; 12. a humerus, two inches and a-half long, five-eighths of an inch broad at its inferior extremity, and half an inch broad at its superior one; a brownish-red substance, apparently muscular tissue, could be scraped off it; 13. the left clavicle, twenty-five lines long and firm in texture; 14. the left shoulder-blade, sixteen lines long, its greatest breadth one inch; the acromion process projected two lines; 15. a fragment of the right shoulder-blade with a distinct spinous process; 16. twelve ribs, the smallest of which was two inches, and the largest two inches and a-half long, hard in texture, and strongly arched; 17. both thigh-bones, each being three inches long, half an inch thick at the acetabular extremity, one quarter of an inch in diameter in the middle, and three quarters of an inch in breadth at the knee end, hard in texture;* 18. two tibiæ and two fibulæ; each tibia was two inches and a-half long, half an inch broad at the superior extremity, and five-eighths at the inferior extremity, three lines broad at the centre of the body; both fibulæ were each exactly two inches

* The discovery of the centre of ossification in the epiphysis of the femur had not then been made (*vid.* § 97, Special Division). Its discovery in this case would have been of the utmost importance.

and one-eighth long, at the superior extremity two lines and a-half broad, and three lines broad at the inferior extremity. In accordance with these results I gave it as my opinion—"1. That the bones examined were those of a child; 2. That their configuration, condition and dimensions, proved that the child *had been at all events viable*, and that it most probably had been *perfectly mature*; 3. That nothing can be said with even probability as to its having been alive during or after the birth; and 4. That the child had probably been buried from one year to one year and a-half." (*Vid.* above § 20.)

Case XXX.—Determination of the age of a Fœtus in which a change of Adipocire had already commenced.

This case may serve as a remarkable example of at how early a period the formation of adipocire may, exceptionally, take place.

L., an unmarried woman, had secretly given birth to a child and made away with it. She confessed that she had given birth to a child once previously, and again just lately, that is, *about three weeks ago*. I had to determine the truth of this statement by examining her. Her breasts still contained a few drops of rich milk. The well-known corrugated appearance of the abdominal parietes was of course of no avail in the present instance. There was still a trace of the lochiæ remaining, and the *os uteri*, which was notched, was still open and of the size of a silver three-penny piece. In accordance with these appearances, I gave it as my opinion, that L. had indubitably given birth to a child within the last few weeks, and that from the fatty condition of the milk, and the still incomplete closure of the *os uteri*, it was in the highest degree probable, that the child born was more mature than a fœtus of four months. A short time afterwards the child was found wrapped in a cotton apron, and superficially interred in the earthen floor of the *damp cellar*, and brought to us for medico-legal examination. It was already very much decomposed, and on the extremities, and particularly on the right fore-arm and thigh, the formation of adipocire had commenced. All the cavities were open, the skull-bones had fallen asunder and lay near the body, the brain had run out. However, from the appearance of the well-preserved upper and lower extremity, the latter being eight inches long, and still very fat and round, from the weight of the fœtus, which, in spite of its putrefied state, and somewhat helped instead by the adhering earth,

amounted to seven pounds, from its length, finally, which, in so far as it could be ascertained, was nearly nineteen inches, I was obliged to decide that the fœtus had certainly *more* than four months of uterine age, that it was in fact most probably mature, or at least nearly so. Thus the autopsy of the child completely confirmed the opinion we had given from the examination of the mother.

Case XXXI.—A Threefold Exhumation of a Body for different Purposes.

One of the most remarkable criminal cases of recent times, and one wholly unparalleled in its medico-legal interest, and which gave rise to a perfectly novel medico-legal question, which we were called upon to answer (*Vid.* On Tattooing, § 32, General Division), is to be found in the examination of the postilion Schall, suspected of having murdered his associate, a cattle-dealer, named Ebermann.* Amongst the other peculiarities of this case, that happened, which probably never happened before, viz., that the body of the murdered man was three times exhumed, on account of the great difficulty of getting it identified. The first disinterment took place nine days after the autopsy, because a strange woman asserted that her husband was missing, and she thought she might discover him in the person of the murdered man. Indeed she did assert, that she recognised the body; but the whole matter was afterwards discovered to be either a fraud or a delusion. The body was exhumed for the second time five months after death, to ascertain whether certain tattoo marks, which Ebermann had on his arm were then present on it, the utmost importance being attached to this query, at this stage of the proceedings. The putrefaction was, however, of course too far advanced at this time to permit the ascertaining of the presence of any tattoo marks. The third exhumation, of the head only (which had been cut off at the time of the murder), took place two years and a-quarter after the interment, because the mistress of the person supposed to be murdered,—his identity being still doubtful,—declared that her paramour had such peculiar *teeth*, that she could at once recognise them. We subsequently had to

* *Vid.* Casper's Vierteljschft. I. s. 274, &c., and Monthly Journal of Medicine for September, 1852, p. 304.

examine these skull-bones, for the purpose of ascertaining if the fatal shot had entered behind the left ear? but this could not be made out with any degree of probability, inasmuch as the charge from a double-barrelled gun had blown the head to pieces, and in its present condition no trace of any shot-hole could be found, but the skull lay before us as a heap of broken pieces of bone. On the other hand, the under-jaw was quite fresh, that is, it was completely skeletonized, but firm and yellow (not whitish-yellow and soft as the bones by-and-by become), and contained a complete and beautiful set of teeth. Remarkably enough, there was yet upon the chin a piece of red beard, attached by means of a bit of dried-up skin to the otherwise bare bone. These teeth were referred to me with the singular request, that I should state whether they had any resemblance to those of the brother of the supposed murdered cattle-dealer?! I reported, that there was certainly a resemblance between the two sets of teeth, but that no inference could be drawn from this observation. The case afforded many remarkable illustrations of the singular questions which may be referred to a medical jurist for answer.*

* *Vid.* also Case XIV., of the exhumation of a fœtus; and also Case CLXXX., that of a child exhumed after twelve days.

PART THIRD.

NATURE OF THE EXAMINATION OF THE BODY.

Statutory Regulations.

§ 156 *of the Criminal Code directs that the dissection of the bodies of suicides be carried out according to the regulations, i.e., that a complete medico-legal autopsy of the body be made. But on the 4th of December,* 1824, *this construction of the statute was in so far altered by the promulgation of the following Cabinet order:— "That the complete medico-legal autopsy of the bodies of suicides is no longer to be required when the suicide is proved, or is clearly evidenced by the circumstances."*

Criminal Code, § 156.—*Should, however, the death be credibly shown to have been caused not by suicide, but by accident, or from any misadventure not involving the guilt of a third party, the body is merely to be externally inspected.*

§ 157.—*Should the dead body be that of a new-born child (in the sense of the Criminal Code—a bastard child which has either been dead-born or has died within twenty-four hours after its birth, no midwife or other decent woman having been present at the birth), or should, on the inspection of the body, the slightest suspicion arise that the death may have been caused by poison, or that the violent death may probably involve the guilt of a third party, then the autopsy must be at once carried out by the experts in the presence of the law authorities, and the report transmitted to the superior court —(in this case to the court requiring the autopsy).*

§ 159.—*When the presiding legal official shall differ with the physician or his proxy as to the necessity of an autopsy, this must be carried out should only one of them consider it necessary.*

§ 160.—*The place of the ordinary physician may be filled, when necessary, by a regimental or battalion surgeon, or by a medical*

man, to be sworn for the purpose. The place of the surgeon may be filled by a second physician.

§ 161. — *Previous to the examination, the presiding official must first take care to have the body exposed for the purpose of identification to the view of those acquainted with the deceased, and if possible, also, to the suspected or avowed perpetrator of the deed. Should this not be possible, the presiding official must take every means to assure himself that there has been no error nor mistake in respect to the body.*

§ 162.—*He must then request the experts to commence their inspection of the body, to ascertain its conformation, and also to note the position, size, and depth of any external injuries which may be on it. The opinion of the experts as to the nature of the weapons employed in the production of these injuries must be heard in every case; any weapons found must be laid before them, and their ovinion taken as to whether the injuries could have been produced by said weapons, and also whether, from the position and size of the wounds, any conclusions can be drawn as to the mode in which the perpetrator had acted, as to his object and personal strength?*

§ 163.—*In the case of bodies taken out of the water, found suspended, lying out during severe cold, or enveloped in the fumes of charcoal, the examination of the experts must be carefully so directed as to ascertain whether the apparent has been the actual cause of death, or whether the body has been placed in the situation in which it has been found subsequent to the occurrence of death from any other cause.*

§ 164.—*A complete medico-legal examination of the body (obduction) includes the opening of the cranium, thorax and abdomen, and the inspection of the principal viscera and other parts of the body, whose injury may be productive of important results.*

§ 165.—*Although the experts may recognise with certainty the evident tokens of a violent death in any part of the body, they must still complete the opening of its three cavities.*

§ 166.—*In the case of new-born children the hydrostatic test must be avoplied, and special attention paid to all those signs which can determine the opinion of the physician as to whether the child has been born dead or alive, mature or immature.*

§ 167.—*Where it is suspected that the deceased has been poisoned, the physicians must submit to chemical analysis any remains of the supposed poison, and also any suspicious matters which may be found*

in the stomach and alimentary canal. And here the presiding official must exercise the utmost circumspection in making sure that the solid and fluid matters to be analysed are not changed, but that their identity is placed beyond a doubt. For this purpose, when the analysis does not take place in presence of the presiding official, these matters must be sealed by both the experts, delivered up along with an official report, and in like manner received back again.

§ 168.—*The presiding official takes down a complete minute (protocol) of the entire procedure at the examination of the body, in which must be circumstantially detailed all that has been done according to the foregoing directions. The presiding official must in this protocol (or minute) declare every important proceeding of the experts, exhibiting in it all that the external senses have taken cognizance of, and inserting besides these matters of fact, also the result of the examination and the opinion of the experts in general, the reasons for this opinion being reserved for a future report (obductions-bericht), and this protocol must then be signed by the experts.*

§ 169.—*The experts must prepare a complete report (Bericht) of the examination, in which must be described the external and internal injuries, the condition of the vital organs and of the body generally; and it must contain in the case of new-born children, the conclusion arrived at as to their maturity and as to their having been alive during or subsequent to their birth; they must also subjoin their opinion as to the lethal character of the injuries and the cause of death, and they must specially answer the three following questions, or specify the reasons why this cannot be done:—*1. *Whether the injury be such that, unconditionally, and under all circumstances, it must have of itself proved fatal to any person of the same age as the person injured?* 2. *Whether the injury must of itself have proved fatal to a person of the same age and habit of body as the person injured?* 3. *Whether the injury, having regard to the time of life of the injured person, has proved fatal from the failure of some remedy essential to its cure, or from the supervention of some external detriment.**

Should any one of these questions be not perfectly distinctly answered, or the reason specified why this cannot be done, the presiding official must insist on a supplementary explanation on this point from the medical inspectors.

* The answering of these three questions is no longer necessary since the publication of the new Penal Code in 1851, and of the "Regulations" in 1858, which will be quoted immediately.

§ 170.—*This report must be signed by the medical inspectors, and if an (official district) physician have been present at the autopsy, the report must be sealed with his official seal.*

§ 171.—*The omission of the direction contained in* § 170, *when there is no other reason to doubt that the report has proceeded from those qualified experts who performed the autopsy, has no influence in the decision of the matter, but will only draw down censure upon those who have thus laid themselves open to it.*

§ 172.—*When the contents of this report vary materially from those of the original protocol, the presiding official must require the experts to explain, either* vivâ voce *or in writing, their reasons for this difference.*

Circular Rescript of the Minister of State for the Interior, of date 28th January, 1817. *Every forensic or district surgeon* is officially required to possess, in good and faultless condition, the following instruments necessary for the dissection:—Four to six scalpels, two with straight, the others with round edges; one razor, two strong cartilage knives, one of them double-edged; two pairs of forceps, one pair of hooked forceps, two single hooks, one double hook, two pairs of scissors, one straight with blunt points, either probe or merely rounded, the other curved (Richter's); one blow-pipe, two probes, one saw, one chisel and a mallet; six crooked needles of various sizes; one pair of callipers, and one foot-rule. The physician must possess one foot-rule, one graduated measuring glass, one pair of scales, with weights up to* 10 *lbs. The Government must issue directions in accordance with this, and see that they are properly carried out.*†

All the existing statutory regulations have been collected by the Royal Scientific Commission for Medical Affairs, in their Report dated 15th November, 1858, and recognised as universally obligatory, and published in the Ministerial Rescript, dated 1st December, 1858.

Regulations for the Performance of the Medico-legal Examination of Human Bodies.

I. General Directions.

§ 1.—*Legal inspections and autopsies may only be made by the*

* The forensic *Wundarzt* and district *chirurgus* are lower and higher grades in forensic surgery. They alone are the active agents in making the autopsy.—Transl.

† *Vid.* the correlative Statutory Regulations, § 52.

medical experts, upon the requisition of the law authorities, and the latter only in the presence of the proper criminal officers.

§ 2. *The forensic physicians are bound to conduct personally every legal inspection of a body required of them, and, in conjunction with the forensic surgeons, to perform every legal autopsy, and can only be permitted to act by proxy under those circumstances recognised by law as entitling to exemption.*

§ 3. *Autopsies must not be undertaken till after the lapse of twenty-four hours after death, provided the time of death shall be known. The mere inspection of a body, however, may be undertaken at an earlier period.*

§ 4.—*The medical men are not usually to decline or omit to perform an autopsy on account of the existence of decomposition; for even at a very advanced stage of putrescence anormalities and injuries of the bones may be ascertained, many circumstances of importance in establishing a disputed identity, such as the colour and condition of the hair, want of limbs, &c., may be determined, penetrating foreign bodies discovered, pregnancy detected, and proofs of many kinds of poisoning may still be established. Therefore, should the exhumation of a corpse be required for the purpose of deciding any of these questions, medical men are to determine upon its propriety without any reference to the period elapsed since the death.*

§ 5.—*The medical jurists have to take care that the necessary instruments are at hand, and in good order at every autopsy. The forensic surgeons are moreover charged, at the close of the examination, and after removing its traces as far as possible, with the duty of properly sewing up the openings made in the body.*

§ 6. *There must be procured for the examination, as far as possible, a roomy, well-lighted place, with proper accommodation for the body, and in a quiet situation. Autopsies by artificial light are not permissible, except in those rare cases in which delay is inadmissible. In such a case the fact must be specially noted in the protocol* (§ 19), *along with the reason which rendered it imperative.*

II. Proceedings at Post-mortem Examinations.

§ 7.—*It may sometimes be necessary for the medical inspectors to examine in the first place, and from a medical point of view, the exact spot and the locality in which the body has been found, to ascertain the position in which it was discovered, and to inspect the clothing. In gene-*

ral, before doing this, the medical inspectors will wait until they are required by the legal authorities, but in certain circumstances it may be also proper for them to point out the necessity of such a preliminary investigation. The medical inspectors are also entitled to demand from the legal commission present at the autopsy, any other information respecting the circumstances attending the death of the deceased, in so far as these shall have been at that time ascertained.

§ 8.—*Should there be injuries upon the body, which appear to have been the cause of death, and should weapons have been discovered with which these injuries might have been inflicted, then the medical inspectors must institute a comparison between them, and, on demand of the presiding Judge, must state whether the one could have been caused by the other, and further, whether any conclusions can be drawn from the position and size of the wounds as to the mode in which the perpetrator had acted, and as to his object and bodily strength.*

§ 9.—*The post-mortem examination consists of two leading parts:*
A. *the external examination or inspection.*
B. *the internal examination or autopsy.*

§ 10.—*At the external examination there is to be observed the external conformation of the body in general, and of each of its individual parts in succession. In respect to the body generally, the points to be noticed are: age, sex, size, corporeal build, state of general nutrition, special marks or deformities, such as scars, tattoo-marks, excess or defect of limbs, marks of disease, as ulcers, &c., all of which circumstances are to be registered* (§ 21), *particularly in the case of bodies as yet unclaimed. Further, in the case of every body the signs of death and of the commencement of putrefaction, if it have begun, are to be carefully ascertained. For this purpose, after carefully washing off the body all blood, ordure or dirt, &c., the existence or non-existence of cadaveric rigidity must be ascertained, as well as the general colour of the skin of the corpse, and the degree and nature of the discolorations, if there be any, of its individual parts from putrescence, also the nature and condition of the post-mortem stains, which are to be proved to be such by incisions, so as to avoid any possibility of confounding them with ecchymoses.*

In inspecting the various parts the following points must be attended to:—in the case of unknown bodies the colour of the hair and the eyes must be described; this is not usually required in the case of known bodies; the possible presence of foreign bodies in any of the natural

openings of the body must be ascertained; also the state of the teeth and the condition and position of the tongue.

Then are to be examined—first the neck, then the breast, the abdomen, the back, the anus, the genitals, and, lastly, the extremities. If a wound be found on any part, its position and direction must first be given with reference to the neighbouring fixed points of the body; and then its length and breadth in Rhenish inches; the probing of solutions of continuity during the external inspection is in general superfluous, since their depth is readily discovered at the internal examination of the body and of the wound itself. Should, however, the medical inspectors consider it requisite carefully to probe the wound, they must state their reasons for this proceeding in the protocol (§ 19). *Further, the condition of the edges and circumference of existing wounds must be considered, and after this examination and description, the original wound must be enlarged in order to permit the examination of the internal condition of the edges and of the subcutaneous cellular tissue.*

In the case of wounds and injuries evidently unconnected with the cause of death, such as the marks of attempts at rescue, of the gnawing of animals, &c., it is sufficient to give a summary description of the appearances. It is also permitted to compare the general form and appearance of ecchymoses, and of cuticular excoriations, &c., evidently unconnected with the cause of death, to a piece of money, a fruit, &c.

§ 11.—*At the internal examination, the three great cavities of the body, the head, thorax, and abdomen, are to be opened. In every case in which it may seem important to open the spinal column, it must not be omitted. The first thing to be observed on opening each of these three cavities is the position of the organs they contain; next, whether there be any fluid effusions present, the quantity of which must be ascertained by weight, and lastly, the external and internal appearance of each separate organ. If there be any reason to believe that the cause of death is to be found in any particular cavity, it should be opened first; in other cases, commencement is to be made with the head, the thorax and abdomen coming next in order.*

In regard to new-born children (*vid.* § 16).

§ 12.—*Unless injuries* (*which as far as possible must be avoided by the knife*) *require some other mode of proceeding, the best way of opening the head is by making an incision across the skull from one*

ear to the other, and then tearing off the cranial coverings to the back and front. After the external surface of the calvarium has been examined, it is to be removed by a circular cut with a saw, and its inner surface and the condition of the skull-bones examined. The state of the dura mater, pia mater and arachnoid may then be investigated; the cerebral hemispheres are next to be sliced off so as to display the consistence and degree of vascularity of the cerebrum, any effusion that may exist, the presence of any foreign bodies that may have penetrated the brain, &c., the condition of the ventricles and their choroid plexuses, as well as that of the tuber annulare and the medulla oblongata; the condition of the cerebellum is next to be examined by means of several incisions, the basis of the cranium is afterwards to be observed, and finally, the condition of the sinuses.

§ 13.—*To lay open the neck, thorax and abdomen, it is generally sufficient to make one long incision from chin to pubis, through the general integuments, passing to the left of the umbilicus. The neck must be first examined, and special attention paid to the larynx, trachea, fauces, œsophagus, the large blood-vessels and trunks of the nerves and the vertebræ of the neck.*

In order to ascertain the nature of the contents, if any exist, of the tracheal branches, after opening the trachea and the thorax, careful pressure is to be made upon the lungs, and if any fluids are thereby forced into the trachea their nature is to be observed. In cases in which a more careful examination of the larynx seems important, it is to be removed and opened from behind.

To open the cavity of the thorax, it is most convenient first to divide the costal cartilages close to the ribs, avoiding puncturing the lungs. The diaphragm is next to be separated from the lowest rib and from the ensiform cartilage, the sternum is then to be turned upwards, and its manubrium separated from its connection with the collar-bones and the cartilages of the first rib—carefully avoiding the blood-vessels lying beneath. The thymus gland—if it still exist—is now to be examined, then the bronchi, the costal pleura, the pericardium and the heart, which is to be left as far as possible in its normal position, and lastly, the large blood-vessels.

§ 14.—*The abdominal cavity is laid open by continuing the longitudinal incision already mentioned* (§ 13) *through the peritoneum. The abdominal coverings are now to be laid back to either side, so that the smooth edge of the lower rib on both sides may be seen. In accordance with the general directions* (§ 11) *respecting every cavity, the objects in*

the abdomen that are to be examined, are the liver, the stomach and intestines, the omenta and mesenteries, the spleen, kidneys, and urinary bladder; in females, the uterus and its appendages, the great blood-vessels, and, should the nature of the case require it, the peritoneum. In order to insure a correct estimation of the quantity of blood in the vena cava inferior, it is proper somewhat to elevate the upper part of the body till after the examination of the abdomen is finished. In order to discover the source of hæmorrhage from any wounded vessel, the trunk of it may be opened and air blown in through a tube.

§ 15.—*Should there be any suspicion of poisoning, double ligatures must be tied round the lower part of the œsophagus and about the middle of the small intestine, and both must be divided between those ligatures. The stomach and upper part of the small intestine are then to be taken out of the body, and after a preliminary anatomical inspection placed in a clean vessel of porcelain or glass, and delivered to the law authorities for further investigation. The œsophagus is also to be tied close to the pharynx, divided above the ligature, anatomically inspected, and placed in the same vessel. Finally, other substances and parts of organs, as blood, urine, pieces of the liver, spleen, &c., are to be removed from the body, placed in separate vessels, and delivered to the law authorities for further investigation, when it is expected that traces of poison may be found in them.*

§ 16.—*In the post-mortem examination of new-born children, special attention is to be bestowed on the following points:—*

In the first place, the signs of maturity and viability must be ascertained. These are—the length and weight of the child, the condition of the general integuments and of the umbilical cord, the length and condition of the hair on the scalp, the size of the fontanelles, the diameters of the cranium (longitudinal, transverse, and diagonal), the condition of the eyes (membrana pupillaris), the condition of the cartilages of the nose and ears, the transverse diameter of the body at the shoulders and hips; in males, the condition of the scrotum and position of the testicles; in females, the condition of the external parts of generation. Finally, we must examine the inferior epiphysis of the femur for its centre of ossification; to this end the skin over the end of the femur is to be divided, the femur itself forcibly bent at the knee-joint, the patella removed, and thin layers cut from the cartilage at the end of the femur, till the greatest diameter of the centre of ossification (if present) be attained; the exact measurement of this is then to be taken in lines.

Should the condition of the fœtus be such as clearly to prove it to have been non-viable, it is not necessary to proceed further with the examination, unless the law authorities distinctly require it.

§ 17.—*If it shall appear from this examination that the child has been viable, we must in the next place ascertain whether it have actually lived (that is, breathed) after birth. To this end we must institute the* docimasia pulmonaris, *and with this view (a), immediately on opening the abdominal cavity the position of the diaphragm in relation to the ribs is to be carefully noted, and in order that this may be correctly ascertained, the abdomen of every new-born child is to be opened first of all, and then the thorax and cranium; (b) attention must be paid to the amount of dilatation of the lungs and their relative situation thereon dependant, particularly with relation to the pericardium; (c) the pericardium is now to be opened and the trachea ligatured, and divided above the ligature, in order that the thoracic organs may be taken out of the cavity; (d) after these organs have been thus removed, the trachea and its subdivisions are to be laid open and inspected; (e) the colour and consistence of the lungs are then to be noted; (f) after removal of the thymus gland, the heart and lungs are to be placed in a roomy vessel full of pure cold water, in order to test their buoyancy; (g) the lungs must then be separated from the heart and their own peculiar buoyancy ascertained; (h) incisions are next to be made into both lungs, and notice taken whether there be any crepitating sound to be heard; (i) attention is to be paid to the amount and quality of the blood issuing from the cut surfaces on the application of gentle pressure, and (k) the lungs are then to be incised beneath the surface of the water, to see whether any air bubbles rise from the cut surfaces; (l) finally, the lungs are to be separated into their lobes, and these cut into many pieces, and the buoyancy of each part carefully tested.*

§ 18.—*The medical inspectors are also generally held bound properly to examine every other organ not mentioned by name in the Regulations, in any case in which they are found to be injured or otherwise anormal, and to incorporate the result in the protocol of the inspection.*

III. Framing the Protocol and Report.

§ 19.—*An exact protocol of every thing done and observed at the post-mortem examination must be drawn up by the presiding Judge at the same time and place.* (§ 168 *of the Criminal Code.*)

§ 20.—*In examining the body, the medical inspectors must always keep in view the judicial object of the investigation, and its distinction from a purely anatomico-pathological dissection, they must, therefore, investigate with precision and completeness everything bearing upon this object, avoiding at the same time all irrelevant prolixity. Every important appearance discovered must be pointed out to the presiding Judge before being set down in the protocol.*

§ 21.—*The technical contents of the protocol of the autopsy, dictated by the judicial physician present, must be clear, concise, and as far as possible intelligible to non-medical persons. And for this purpose, in the nomenclature of the appearances found, the use of foreign scientific terms is to be avoided so far as may be consistent with the preservation of distinctness. In the technical portion of the protocol the two leading divisions, the external and internal inspections, are to be distinguished by large capitals (A and B), and the opening of the three great cavities by roman numerals* (I, II, III). *Moreover, the examination of each separate part is to be included in a distinct paragraph, headed by an arabic numeral, and these numerals must run consecutively from beginning to end of the protocol. Several parts are never to be included under one numeral, nor treated of collectively, and no part is ever to be passed over in silence. The appearances found must be accurately described in the protocol, and no mere opinion is ever to be given (as for example, "inflamed," "gangrenous," and the like). At the conclusion of the autopsy, the medical inspectors must enter in the protocol their provisional views regarding the case, summarily and without the addition of any reasons.*

§ 22.—*Should a report (reasoned opinion) be required from the inspectors, after a customary short official introduction, as free as possible from useless formalities, they must give a brief narration of the facts of the case, so far as their cognizance permits, and they must then incorporate in this report so much of the protocol of the autopsy as is neccssary for the elucidation of the case, using the exact words of the protocol and the same numerals, and expressly pointing out any accidental variation in this respect. The style of this report must be concise and clear, and the reasoning upon which the opinion rests must be so developed, as to be convincing even to non-medical men. Where the Judge has put distinct questions to the medical inspectors, these must be answered fully, and, as far as possible, word by word, or the reasons given why this cannot be done.*

In accordance with § 185 *of the penal code of the* 14*th April,* 1851, *it is no longer necessary to answer the three questions proposed in* § 169 *of the criminal code, or the four questions contained in the ministerial rescript of the* 15*th May,* 1833, *addressed to the Rhenish provinces, regarding death from injuries, unless the medical inspectors are expressly requested to do so. Since it is evident that every such report must be prepared conscientiously, and according to the teachings and principles of science, therefore, no assurance that this has been the case is required to be appended to it by the medical inspectors. This report must be signed by the medical inspectors, and should a district physician have assisted at the autopsy, his official seal must be affixed to it. Every such report must be given in at the latest, four weeks subsequent to its being asked for.*

BERLIN, 15th November, 1858.

The Royal Scientific Commission for Medical Affairs.

CHAPTER I.

EXTERNAL INSPECTION OF THE BODY.

§ 29. Inspection of the Dead Body.

Coolness, impartiality, and zeal in his work are the conditions necessary, if a medical jurist would satisfy himself and those concerned in the execution of this, the most important of all the labours intrusted to his skill; the most important, because carelessness, or errors now committed can never afterwards be remedied. Coolness—for whoever, from want of knowledge or experience, or any other cause, proceeds to this work in a hurried or embarrassed manner, is only too likely to begin at the end, and to end at the beginning; he jumps from the inspection of the eyes to that of the extremities, from these to the tongue, from the tongue to the umbilical cord, and, finally, produces a protocol of the inspection so confused as to be unintelligible even to an expert. Impartiality—this also is a most necessary attribute of the medical jurist, in every case, but specially when at the dissecting-table; without it he sees distorted features, and forthwith concludes, that the death has been a violent one, which he can by-and-by easily be able to show; whilst in the same case, the man of impartiality and experience only sees—for example, that one eyelid has been pushed up after death and so remains, that the mouth has after death been drawn to one side and distorted, that the nose has been flattened by lying on it, and not by a blow, &c., so that all such distortions are easily enough explained. It is a great advantage and simplifies the matter much to follow some certain plan in investigating the various points which come under notice at an external examination of the body, and are inventoried in the protocol. And the following would seem to be the most advantageous order in which to take up these various matters:—

(1.) *The Sex.*—In completely decomposed bodies this of course can no longer be recognised. At a somewhat less advanced stage of decomposition, even after the external parts of generation have been

completely destroyed, the sex may still be ascertained by a reference to the growth of the hair around these parts, in so far as the circumscribed circlet of hair on the *mons veneris* is distinctive of the female, while its prolongation, however slight, from this point towards the umbilicus is equally distinctive of the male. It is well known, that up to the third month of uterine life, the sex of an embryo is not to be distinguished; the use of a strong magnifier is, however, of much use in such cases (*Vid.* below under (13)).

(2.) *The Age.*—In the case of known bodies, the age assumed is of but little importance, because in such a case the Judge can, if necessary, easily obtain more certain information than a mere medical opinion. In the case of unknown bodies, however, where it may be necessary for advertising the particulars of the unknown dead body that has been found, this matter must rest entirely upon medical opinion. But if it be difficult to decide as to the age of a living person, where the look, gait, carriage, expression, &c., can all be taken to account, how much more difficult is it to estimate even approximately the age of a dead person. An entire or defective state of the teeth, grey hair or the reverse, may of course deceive, and wrinkles may be effaced by the swelling of the body, &c. The most experienced, therefore, can but rarely do other than allow tolerably wide limits to this conjecture—*e. g.*, "between twenty and thirty years." In this respect, also, the bodies of children are extremely deceptive, which would scarcely be expected, considering that the age of living children can be much more readily guessed than that of adults. But, here too, appearance and demeanour, clothing, and other circumstances wanting in the naked corpse, assist our judgment. When we reflect that growth proceeds variously in different children, and yet, that the size of the body is almost the only criterion for guessing the age, and when we also reflect, that every body increases in length after the cessation of cadaveric rigidity, we shall readily excuse even an expert should he declare the body of a child of two to be that of one of four years old.

(3.) *The size of the body.*—For estimating the size of the bodies of new-born children, Siebold's balance is the most convenient thing for the medical jurist; one of the scales of it is made of lacquered leather, on which a foot-rule is painted in oil-colours, upon this the body of the child is to be stretched with both hands, and its length can then be read off at once. A simple six-foot measuring rod, with one end divided into inches, is the most convenient instrument for

determining the length of the bodies of adults, this must be taken in a straight line from the crown of the head to the sole of the heel, these being the terminal points of the length of the body.

(4.) *The general condition of the body.*—There can be no difficulty in ascertaining this in any case. Only gross ignorance could describe an abdomen distended with gas as a fat belly, or mistake *anasarca* for corpulence, &c.

(5.) *Signs of death.*—These we have already related in § 7, and they must of course be always sought for and described in the protocol. But with respect to the post-mortem stains, the condition of the cornea, and the cadaveric rigidity, it must be remembered, that should the body show only the merest trace of decomposition, be it the most trifling green coloration of the abdomen, so soon as this has been registered, no more search for the earlier (above-mentioned) signs of death is required. The major proposition involves the minor, and everything superfluous must be always avoided in the protocol.

(6.) *Colour and condition of the hair.*—In respect to this, as well as the other individual particulars of a body, it may be demanded whether,—according to the present construction of the penal code, which states, that "causes of death inherent in the individual are no longer to be taken cognizance of" (*Vid.* Penal Code, § 185),—the examination and description of the hair, eyes, teeth, &c., is any longer required? But, irrespective of the fact that the existing "regulations" in § 10, prescribe this examination in the case of unknown bodies, and consequently, no (Prussian) medical jurist is at liberty to omit it, any alteration in this respect would be unadvisable. No doubt often, perhaps in most cases, it is quite unimportant whether the body—to determine whose mode of death is usually the sole object of the legal inquest—had fair or dark hair, blue or grey eyes, perfect or defective teeth, &c. But at the time of the medico-legal examination the whole of the case cannot be had in view, and physician and judge alike cannot as yet anticipate to what seemingly trifling circumstance great importance may become attached in the course of the case, the early neglect of which may be then most deeply deplored. In Case LXI., given below, of fatal ill-usage of a child, the guilty person had, amongst other things, knocked off the crown of a double tooth, and this, as well as every other act of violence, she denied. This defect we had taken notice of in the protocol; and three days after the dissection the crown of this tooth

was found in the sweepings of the room in which the accused had committed the murder, and this circumstance became of course of the greatest importance. Moreover, the careful description of these generally unimportant matters becomes sometimes of the utmost importance in establishing the identity of an unknown body, and this is very well shown in the history of Case CCCXIV. detailed below, that of a man indubitably murdered. We had of course described in the protocol of the inspection, the colour of the eyes and hair (and of the peruke also, firmly attached to the bald portion of the head). Subsequently, the identity of this body, with that of a man missing, which had been suspected from various circumstances, was thrown into doubt, and towards the end of the inquiry, the wife of this missing man was examined as to the colour of his hair and eyes, but she, being of very weak intellect, knew not how to describe them!

(7.) *Colour of the eyes.*—This point is one extremely apt to mislead in the dead body, wholly irrespective of the fact, that the discrimination of colours is somewhat of a special faculty. If the body be perfectly fresh, and the colour of the iris is a decided blue or brown, then indeed two or more observers will be certain to recognise it as such, but if the colour be, as it often is, greenish-blue, greyish-brown, or quite lustreless, then we may be quite certain, that A. will have a different opinion of it from B. Moreover, the process of decomposition very soon alters the original colour, and, as the white of the eye becomes by sugillation reddish-brown, and finally, greenish-black, so the iris also undergoes a similar change of colour.

(8.) *Number and condition of the teeth.*—In the case of known bodies the specification "complete" or "incomplete" will generally suffice. In the cases of unknown bodies, however, a more exact description of their number and condition is required, for the reasons already mentioned. I may refer to the trial of Schall for proof of this, for in the course of it, it became necessary to exhume the head of the murdered person for the third time, solely and alone to examine his teeth (*Vide* page 81).

(9.) *The position and condition of the tongue.*—The opinion that the position of the tongue between the jaws or teeth is a sign of death by suffocation is as general as it is erroneous, as I shall by-and-by have to show. Nevertheless, the investigation of the position of the tongue, whether behind, between, or protruded before the teeth

(or jaws) must never be omitted. Its condition is, however, still more important. It may be normal or swollen, injured or uninjured, and particularly in doubtful cases of poisoning with corrosive poisons, the noticing or not noticing the state of its mucous surface may serve to clear up or obscure the case, as is shown by the following very peculiar case.

Case XXXII.—Suicide by Sulphuric Acid, alleged to be a Case of Murder by Cutting the Throat.

On the 24th of June, 18—, in a market-town, not far from Berlin, a mother, with her two little children, were found dead in their room with great gashes in their throats. The medical inspectors supposed they had found "an effusion of half-a-pound of black, treacly blood in the abdomen, the coats of the stomach torn and stained with black, treacly, carbonised blood, the spleen also torn and pultaceous;" the physician declared this to be a case of triple murder, and that the mother had been killed either by first receiving four cuts in the throat and thereafter so falling as to burst the very thin coats of the stomach and the spleen; or, that she had first been violently struck on the stomach, whereby both it and the spleen had been burst and the effusion of blood occasioned. The opinion of the second medical inspector differed from this; and as variations as well as contradictions existed in both opinions, the public prosecutor resolved to summon me at once by telegraph, and to refer the case to me for judgment before the burial of the body. I found the body clad in graveclothes, lying in an open coffin. A yellowish-brown streak, running from the corner of the mouth to the chin, led me at once to the supposition of poisoning by sulphuric acid. The tongue, which had not formerly been examined at all, drawn forward by a hook, appeared to be half tanned, and covered with a muco-sanguinolent fluid, which instantly reddened litmus paper, and a similar acid reaction was displayed by the black pulp in the abdomen, *i.e.*, the carbonised stomach and its contents! Of course no further examination was necessary to explain, that the mother had first killed her children, then attempted to destroy herself with sulphuric acid, and finding that death came not so soon as wished for, had cut her throat with the razor that lay besmeared with blood upon the floor. This opinion was fully confirmed the same evening, after my departure, by finding, on searching the house, a letter from the

deceased, declaring her intention, and the remains of the sulphuric acid in the cupboard.

(10.) *The condition of the natural openings of the ears, nose, mouth and fauces, anus and female organs of generation.*—Cases in which foreign bodies are found in these openings are certainly rare, but they do occur, particularly in drowned persons, in whom mud, earth, &c., may be found, and persons suffocated, particularly newborn children, which are often choked by stuffing their mouths with all sorts of strange substances. But for other reasons also, the examination, particularly of the mouth and fauces, must never be omitted, especially in cases of suspected poisoning by corrosive poisons, as in these cases traces of such poisons may be expected to be found in these situations, and in such as have shot themselves through the mouth. As respects the examination of the vagina, the determination of the existence of virginity, of the presence of the catamenia, or of injuries of the parts, &c., may subsequently assume an importance little thought of at the time of the inspection. The anus is to be examined for traces of evacuated fæces, though I lay but little stress on this sign, as being one that is as often absent as present in every kind of violent death, and not only may the carriage of the body produce it, but the water in which it has been lying may wash away its traces, and thus its appearance or non-appearance is dependant on accident of every kind.

(11.) The neck in every case, for obvious reasons, demands a particularly careful examination. The most trifling yellowish-brown patch leads, *à priori,* to suspicion of strangulation; and there are cases in which the results of the dissection have left the proof of the strangulation which had actually taken place so doubtful that the most careful examination and estimation of the results of the external inspection have been of the utmost value in giving a final opinion on the case. It is equally important to investigate the integrity of the larynx and the cervical vertebræ. In respect to the latter I must, however, guard against an apparently great mobility of the neck leading to rash suspicions of luxation or fracture of the cervical vertebræ, for when the cadaveric rigidity has passed, when the body is lean, or the fat not half-frozen by a low temperature, and particularly in the case of little children, great mobility of the head is a phenomenon of constant occurrence. Lastly, I need scarcely say that small penetrating wounds of the neck, however trifling they may appear externally, may be of the utmost importance in deter-

mining the cause of death, and must, therefore, never be overlooked.

(12.) *The hands.*—These present various important matters for observation. The question does not arise every day, whether a marriage-ring had been worn during life, or merely placed upon the dead body.; this would be easily solved by the finding of a deep furrow on the finger. But much more frequently dried blood is found on the hands that may be of importance in determining the question of murder or suicide, or the hands of those found shot may be burned with powder, or one of them may be injured,—all facts that may be of weight in forming an opinion respecting such cases; or we may have the grey colour of the hands and feet and the longitudinal folds in the skin, betokening that the body has been in the water more than twenty-four hours, or sand, mud, &c., may be found upon and beneath the nails in such bodies, &c. We shall return to this subject by-and-by, when we come to speak of the various kinds of violent deaths.

(13.) The parts of generation must be carefully inspected as well as every other part (*Vid.* under 10); they very seldom, however, yield any information useful in deciding a dubious case; the only exceptions being the discovery by the microscope of an effusion of semen in the case of men found suspended, and that of the peculiar shortening of the penis common to drowned persons (*Vid.* § 45 and § 54, Special Division). I may mention, as something specially curious, that in one case I was asked if I could determine from the state of the genitals whether the deceased had been capable of procreation on a certain day three months before his death!

(14.) *The general colour of the body.*—In general, the usual colour of a corpse is all that is found, and this statement suffices for the protocol. The colour of the white unbleached wax of commerce, a dirty greenish-white, which is the colour of those who have died from hæmorrhage, whether internal or external, is very like, and extremely difficult to distinguish from this ordinary corpse-colour. When injuries of the head prove fatal after long illness, the whole body is often found of that icteric hue which is so commonly present in such cases while alive. The body is also occasionally found of other hues, as a uniform red-brown in aborted fœtuses, the colour of roast-meat in those that have been roasted, coal-black in such as have been quite charred, &c. In describing the general colour of the body, the various hues of decomposition, or if these are not yet visible, then

the colour of the post-mortem stains must be stated. The Prussian regulations very properly direct suspicious or only remarkable looking stains to be washed clean, because if this be neglected more important matters may remain concealed, as, for instance, stains produced by sulphuric acid, or trifling injuries which may be covered by blood, or something important may be supposed to be seen, such as blackening from gunpowder, or a contusion, &c., which the use of a damp sponge at once shows to be mere dirt—truly an every-day experience!*

§ 30. Continuation.—Anormalities of the Body.—(*a*) Products of Disease.

It is quite common to find in medico-legal subjects many deviations from the normal, *e.g.*, herniæ, absence of sundry organs, tumours of various kinds, deformities, ulcers, bed-sores, dropsical swellings, &c. In the case of known bodies, which there is no difficulty of getting identified, all such discoveries are to be most concisely described in the protocol, when a more accurate examination and description is not required by the nature of the case, as when there is a suspicion of malapraxis on the part of the physician attending the deceased. The same may be said of internal anormalities, as tubercles in the lungs, ossification or other organic alterations of the heart, ovarian tumours, &c. (*Vid.* § 23 p. 56), where there is no question of malapraxis, and when the organic anormality does not stand in any direct relation to the death. In unknown bodies, on the contrary, everything externally visible, defects, deformities, and products of disease, must all be correctly detailed, for cases have often enough occurred in which the presence or absence of ulcers, of the want of a finger, &c., has proved of the greatest importance in establishing the doubtful identity of a body.

§ 31. Continuation.—(*b*) Of Scars.

The marks of wounds on bodies, particularly on such as are unknown, are deserving of careful attention, and may give rise to many judicial queries. First of all it may be asked, Do such marks ever entirely disappear? and in the case of Schall this query was con-

* Special reference to the inspection of the bodies of new-born children will be found, Special Division, § 77, &c.

sidered of so much importance in respect to the marks left by cupping instruments and tattooing, as to occasion an exhumation of the body (*Vid.* § 32). The length of time during which a scar may subsist, depends upon the depth to which the vessels and tissues of the cutis has been injured. Scars of injuries which have only affected the epidermis, or penetrated but slightly into the cutis may completely disappear, and may be no longer found on the dead body, though they have indubitably been present at an earlier period of life. To this category belong not only needle scratches, but also venesection wounds, leech bites, and the marks of cupping-glasses. When the cupping instrument has incised deeply, the marks may subsist for many years of life, as daily experience teaches us, but, nevertheless, after a longer lapse of years they may disappear. For we learn from a customary proceeding in France, related by Devergie, that the scars of even deeper injuries of the skin may disappear during life. Devergie* states, namely, that where the brand mark of a galley-slave has vanished, it may be recalled to sight by slapping its usual position with the flat of the hand, till it reddens, the brand mark which cannot redden, at once becomes visible by its permanent whiteness. Scars accompanied by loss of substance never disappear, as is evidenced by the marks of chancres or buboes, contracted during youth and healed with loss of substance, yet remaining to the most advanced age, as well as by the persistance of the scars of various ulcers long since healed. To this category also belong the scars of issues and blisters, which have suppurated for some time, as well as the marks of variola vera; these all leave scars which never completely disappear, because the sores from which they result have produced loss of substance by destruction of the dermoid tissues. Further, all such wounds as heal,—not by *prima intentio*, but by granulation, leave indelible marks. Such scars are quite common in medico-legal subjects, as most of the lower classes have the usual well-known marks of cudgel blows on some parts of their hairy scalp. It comes now to be a secondary question, whether one can from the appearance of the scar, particularly from its colour, form any conclusions as to its age, that is, as to the probable time elapsed since the receipt of the injury? All scars, whether arising from injuries or the exanthemata, exhibit at first a well-marked red colour distinct from that of the surrounding skin, which, by-and-by, grows white and glistening. But the source of the cicatrix, and the pecu-

* *Op. cit.* II., pp. 31, 32.

liar characteristics of the injured person,—which we can only assume as hypothetical conditions, since, *à posteriori*, we know nothing about them,—cause in this respect the greatest differences. We know, for instance, how varied the time is required for the primarily dark-red marks of small-pox to become white in different individuals, so that in some they are already white at the end of six or eight months, whilst in others, they remain unpleasantly red-looking even after the lapse of two or three years. This is also the case in scars of every nature, even in those caused by injuries. The opinion of the medical jurist respecting the age of any scar must, therefore, be always given most cautiously, and can only be given negatively with any certainty. For instance, we may certainly affirm that a perfectly white and glistening scar cannot have arisen from an injury received two, three, or four weeks previously, because experience has taught us, that under no circumstances do scars become white in so short a period; but we cannot in such a case decide whether the scar be two or six years old. CONSEQUENTLY, THE SCARS OCCASIONED BY ACTUAL LOSS OF SUBSTANCE, OR BY A WOUND HEALED BY GRANULATION, NEVER DISAPPEAR, AND ARE ALWAYS TO BE SEEN UPON THE BODY. BUT THE SCARS OF LEECH BITES, OF LANCET WOUNDS, OR OF CUPPING INSTRUMENTS MAY DISAPPEAR AFTER A LAPSE OF TIME THAT CANNOT BE MORE DISTINCTLY SPECIFIED, AND MAY THEREFORE CEASE TO BE VISIBLE UPON THE BODY. IT IS EXTREMELY DIFFICULT OR IMPOSSIBLE TO GIVE ANY CERTAIN OR POSITIVE OPINION AS TO THE AGE OF A SCAR. In the following case:—

CASE XXXIII.—DETERMINATION OF THE AGE OF A SCAR.

This diagnosis was of some judicial importance in relation to a great burglary, accompanied with violence, the perpetrators of which it was difficult to discover. On the 17th of March we were asked whether it could be determined, if the scar on the finger of the apprentice N., who was strongly suspected of having aided in the deed, had originated in a wound received in the beginning of February, and whether this wound had been caused by a chisel, crowbar, bradawl, blow, or how else? The scar was on the outer side of the right little finger near the metacarpal joint; it was circular, the size of a pea, and of a pale-red colour, surrounded by a border of deeper red. "The statement of the accused, that this wound was produced in a scuffle on Shrove Tuesday last (Feb. 5th), by striking the hand

against a broken porcelain door-plate, is extremely improbable, since a wound produced in this manner would have more of a lacerated and irregular appearance. It is much more probable, that the scar arises from a wound made by some round-pointed instrument, such as a brad-awl or punch. The assumption that the wound was produced six weeks ago, that is, in the beginning of February, is, from the appearance of the scar, not improbable."

§ 32. Continuation.—(*c*) Of Tattoo Marks.

As already related in Case XXXI., I was called upon in the course of a most obscure and intricate criminal case to answer the question—Can tattooing, known to exist during life, ever become so thoroughly effaced as to leave no trace on the body? The inquiry was a perfectly novel one, and, from being entirely omitted by all writers on medical jurisprudence, could only be solved by my own individual investigations. Should the answer be negative, then the particular body in question could not be that of the man missing, because he was well known to have exhibited on his person, when in life, the marks of tattooing, and with the loss of this proof of identity, the whole case against the prisoner accused of murder fell to the ground, which would not, however, be the case could it be shown that even in a single individual such marks had ever really completely disappeared. The practice of tattooing, which in this country is exercised almost solely by men, and that chiefly on the arms and also on the breast, while savage nations cover more or less of the whole body with the pattern, indicating by it various degrees of rank, is accomplished by means of three or four sewing needles, stuck in a cork or piece of wood, and so covered (by being wound round with cotton, &c.) as to leave only the points bare, which are deeply pricked into the skin, on which the desired pattern has been traced. Our lovers of this species of ornament (soldiers, sailors, and the like) usually choose one or two hearts, their own or their sweetheart's initials, a date (of a year, &c.), crossed swords, a tobacco-pipe, and such like. When the bleeding from the small punctures has ceased, some colouring-matter is rubbed into the recent wounds, consisting usually of cinnabar or gunpowder, generally of both, to make the picture striking, or Indian ink, charcoal, ink or Prussian (washing) blue. Desirous of investigating on as large a scale as possible whether such marks might not possibly

be made to disappear during life by the continuous regeneration of the cuticle, and believing that the opportunity desired would be best afforded by a large body of old soldiers, I proceeded to examine the dwellers in our Royal Invalid Establishment,* amongst whom I discovered thirty-six men who had been formerly tattooed. Amongst these I found in one case still some tattoo marks visible after the lapse of fifty-four years; in many others they were quite distinct after more than forty years, whilst in two cases they had completely disappeared after the lapse of the respective periods of thirty-eight and thirty-six years. The general result of this investigation was, that of thirty-six persons tattooed, in three the marks faded in course of time, in two they became partially, and in four wholly obliterated. Consequently, in one case out of nine, the tattooing was found to disappear in course of time. In the open jury court in which I gave this evidence, a competent witness came forward and displayed his arm, which in his youth had been tattooed with cinnabar, and from which every trace of it had disappeared. A year later Dr. Hutin, in Paris, instituted a similar investigation on a much larger scale in the large Hôpital des Invalides of that city, where he found, among 3000 men, no fewer than 506 who had formerly been tattooed. The results he obtained† agree in the main with my own. The colouring-matters employed were the same as those already mentioned, cinnabar being the general favourite. The marks made with it, according to Dr. Hutin, frequently become wholly or partially effaced, those made with Indian ink or powdered charcoal remain visible, while those made with gunpowder, washing blue or ink, generally fade, but in by far the largest proportion of cases never become wholly effaced. This observer found, among the 506 men formerly tattooed, 47 from whom the marks had completely disappeared (one in ten and a-half)—almost the same result I myself had obtained. Two years later the question was anew investigated by a Parisian physician, named Tardieu, who investigated the matter for himself, and has published a valuable treatise on the medico-legal aspects of tattooing.‡ He found that the tattooing had completely disappeared in three cases out of seventy-six, or in one case only out of twenty-five; and this proportion, so remarkably small, when compared with the results obtained by myself and Dr.

* *Vide* the full account of this research in my Vierteljschft. I. s. 288.

† Recherches sur les tatouages. Paris, 1855-8.

‡ Annales d'Hygiène publique. Janv., 1855, p. 171, &c.

Hutin, Tardieu explains by referring to the colouring-matters employed. In all our investigations we found cinnabar to be the pigment most usually employed, whilst Tardieu found a large proportion of his subjects had been tattooed with Indian ink, and he concludes that cinnabar and blue ink create far less indelible marks than Indian ink, soot, or washing blue. That is to say, in other words, that the former pigments are more readily absorbed than the latter. For Follin has re-discovered the pigment vanished from a tattoo mark in the lymphatic glands, and our deceased talented Prof. V. Meckel has made the same observations having found cinnabar, charcoal, &c., in the lymphatic glands of several who had been recently tattooed. And I can confirm this observation from the results of my own experience:—

(1.) On the body of a young man of twenty, who had been drowned, we found a very bright-red A upon the inner surface of the left forearm, obviously very recently tattooed, and with the naked eye we could very plainly see the cinnabar in the axillary glands.

(2.) Another case is represented (Plate VIII. Fig. 25 of the Atlas). It exhibits a gland from the axilla of a man aged sixty, who had died of empyema, and who on the same part of his arm as the former case had tattooed a large, brilliant, and strongly defined red heart, within which were the initials J. C. G., and the date 1858. Along the edge of the gland a copious sprinkling of cinnabar was distinctly seen.

(3.) On the right forearm of a man aged sixty-six, who killed himself by cutting his throat in 1856, there was a heart with the date 1813 (forty-three years previously), and beneath two faces, which were tolerably distinct. All these were tattooed with cinnabar alone, and this was plentifully deposited in the right axillary glands.

(4 and 5.) Four young journeymen-butchers were suffocated in 1857 in carbonic oxide gas. Two of them were tattooed on the right arm. A. had a crown, three initials, and the date 1855. All of these were still (after two years) very distinct, and in the axillary glands there was no deposit of cinnabar. B. had a highly ornamental design, consisting of the head of an ox, beneath it two crossed pole-axes, initials, and the date 1851. Except the figure 5, which was somewhat faded, the design was quite distinct. But in this case (after six years) cinnabar was already deposited in three separate spots of one of the axillary glands.

(6.) G., a pensioner, aged sixty-eight, was killed in March, 1858, by being run over by a carriage. He had on both forearms very well preserved cinnabar tattooings,—a heart and a flower-pot on each arm, on the left the date 1809, on the right, 1814. In the right axillary gland we found cinnabar more plentifully than in any previous case, in the left there were only a few scattered and not very visible particles of cinnabar.

(7.) H., a shopkeeper, aged thirty-eight, hanged himself on the 8th of July, 1858. On the right forearm there was a cinnabar tattoo mark, a heart, a cypher, and the date 1841, all perfectly well preserved. In the axillary glands (after seventeen years) there was a little cinnabar.

Meckel found the cinnabar still more plentifully in the glands of those from whose arms the tattoo marks had almost completely faded, so that it is probable that the absorbed pigment may be found in the glands after every trace has disappeared from the skin. Whether, besides the difference of the pigmentary material, any other influence, such as personal constitution, mode of life, deepness of the punctures, &c., has any effect in hastening the obliteration of the marks must, from the novelty of the question, be left still undetermined. Tardieu also expresses himself in much too decided a manner on another point, when he states that it is possible to determine from the character of the pattern the doubtful identity of the body and the position in life of the deceased, &c., inasmuch as he thinks he has found that soldiers, sailors, and public women, all as classes affect separate and distinct kinds of pictures. Such an idea is evidently likely to lead to gross error, and it is impossible from the state of the facts to recognise it as worthy of general acceptance. Another statement of Tardieu's is, on the contrary, of great practical importance, viz., that tattoo marks may be effaced by art. Acting on the information of a prisoner who had employed art for the purpose of deceiving the judge, Tardieu made a successful experiment on an inmate in the Hospital who had a crucifix tattooed with Indian ink on his forearm. The mark was first well rubbed with a salve composed of pure acetic acid and axunge, then with a solution of potash, and finally with weak muriatic acid. The acetic acid ointment was spread thickly on the arm and allowed to remain for twenty-four hours; next day the solution of potash was well rubbed into the arm four or five times. Neither of these operations occasioned more than a trifling uneasiness. On the following

morning, a thin but firmly adherent crust was found to have formed, and this fell off on the seventh day. But a new crust formed spontaneously, which adhered for more than fourteen days, and then fell off, leaving a flat scar, in which not the smallest trace of the design formerly existing was any longer visible. Experiments of this sort require, however, to be repeated. Nevertheless, the investigations of Tardieu, Hutin, and myself have already ascertained the following facts, which may be of practical value in determining the doubtful identity of a body, namely:—THAT TATTOO MARKS MAY BECOME PERFECTLY EFFACED DURING LIFE; THAT IN NOT A FEW CASES THEY DISAPPEAR, SO THAT THEY ARE NO LONGER VISIBLE ON THAT BODY WHEN DEAD, ON WHICH DURING LIFE WITNESSES HAD OFTEN SEEN THEM, AND THAT THEIR EXISTENCE AT A FORMER PERIOD MAY POSSIBLY BE ASCERTAINED BY AN EXAMINATION OF THE AXILLARY GLANDS.

§ 33. CONTINUATION.—(*d*) INJURIES.

In respect to this most important point of the external medico-legal inspection of the body, several varieties are to be distinguished.

(1.) No injuries are traceable externally, although death had evidently occurred from violence, and from such violence as would naturally lead to the expectation of finding visible traces of it, *e. g.*, personal ill-treatment, kicks, the being driven over, or suddenly falling from a height, &c. "Traces of external injury wanting," is the usual formula in the public judicial notice respecting the finding of an unknown dead body, and then it continues, that there is no suspicion of death by violence, and that there is, therefore, no need of any further medico-legal examination; for where no "traces" are visible externally, we cannot expect to find the death to have arisen from any internal injury. Such reasoning may well be excused in non-medical persons, when we find that all the hand-books on legal medicine pass this subject over entirely, as one perfectly self-evident. Henke alone mentions, in treating of rupture of the spleen, that in such cases there is sometimes no ecchymosis, nor any other external mark of violence, but he adds, that he has had no experience in such cases. But the actual truth is precisely the reverse, and justifies the conclusion, that it is the rule in all such injuries as are followed by *instant or very sudden death*, particularly in all cases of rupture of internal organs proving rapidly fatal from internal hæmorrhage, for the

body to *exhibit no external appearance of violence*, presupposing of course, that the orgin of the injury be not of itself of a penetrating nature, as a gun-shot, &c., because during the short remaining life of the wounded person there is no time for the production of ecchymosis. The following cases illustrative of the occurrence of the most important internal injuries unbetrayed by even the most trifling external trace of violence, confirm the truth of this opinion. This experience has often enabled us to diagnose the rupture of some important organ, in the case of men killed by falling from a height, or by being driven over, &c., *just because* no trace of injury was to be found externally, and our opinion has proved correct in every case. In such cases of course it is easy to satisfy the judicial functionaries, that an autopsy apparently unnecessary from the absence of the external marks of violence, is in truth most needful.

CASE XXXIV.—FRACTURE OF THE RIBS, AND RUPTURE OF THE LIVER AND SPLEEN. NO TRACE OF INJURY EXTERNALLY.

A man, aged 63, was run over by a vehicle, and died in about ten minutes. Two yellowish-brown leathery patches of skin, each the size of sixpence, situate on the left side of the pelvis, and on the elbow were the *only* external injuries. But the seventh and eighth ribs on the left side were fractured diagonally across their centre, *without any trace of effusion of blood in the neighbourhood, and perfectly resembling a fracture produced after death.* There was also a laceration of the liver three inches in length, running diagonally across the under surface of the right lobe, and penetrating half through its parenchyma; there were also two lacerations, each an inch long, in the *lobulus quadratus*, and the spleen was completely broken up.

CASE XXXV.—FRACTURE OF THE RIBS AND RUPTURE OF THE LIVER FROM BEING RUN OVER BY A VEHICLE. NO TRACE OF INJURY EXTERNALLY.

A labouring-man was knocked down by a carriage, and so injured that almost immediate death resulted. With the exception of a piece of skin, the size of the palm of the hand, upon the left side of the chest, which appeared is if burned, and a trifling ecchymosis on the right ileum, neither of which corresponded in situation with

any internal injury, *there was nothing particular to be seen on the body*. But, internally, there was a complete longitudinal rupture of the liver, which had divided it into two parts, and a transverse fracture of the fifth and sixth ribs on the right side, all of which would have remained undiscovered had not the trifling external injuries mentioned above, led to a judicial examination of the body.

Case XXXVI.—Rupture of the Liver from being driven over by a vehicle. No trace of injury externally.

A strong boy, aged fourteen months, was killed by being run over by a carriage. Except a trifling abrasion of the skin on the back of the head, and an ecchymosis the size of a walnut on the right large trochanter, *nothing at all anormal* was visible on the body externally. The head was perfectly uninjured. Just because of this negative result of the external examination in a case of sudden death from such a cause, I diagnosed, previous to the autopsy, the existence of rupture either of the liver or spleen; rupture of the former was found to exist. The right lobe of the liver was almost completely divided by a longitudinal laceration.

Case XXXVII.—A similar Case.

A six-years' old boy was run over and killed. With the exception of quite trifling ecchymotic patches, each the size of a bean, on the left ileum, left knee, left ankle, and right side of the frontal bone, the body exhibited *nothing* peculiar. But in this case also the cause of death was found to be a longitudinal laceration of the liver, which completely divided it into two.

Case XXXVIII.—Rupture of the Pulmonary Artery by an iron fly-wheel. No important external injury.

A large iron machine-wheel fell upon the body of a boy aged five, and killed him on the spot. On the middle of his breast there was a faint-blue patch about an inch long, and not ecchymosed. There was no fracture either of the ribs or sternum, but the right pleural cavity was completely filled with thin fluid blood, and this hæmorrhage was found to have arisen from an exceedingly rare accident,

viz., a rupture of the pulmonary artery, one-third of an inch long, close to its entrance into the right lung. There was in this case general anæmia, and yet there also existed distinct cerebral hypostasis, as well as the usual post-mortem stains (*Vid.* p.p. 20 and 21).

CASE XXXIX.—RUPTURE OF THE LUNGS BY BEING DRIVEN OVER BY A VEHICLE.

A coachman was run over on the 11th of March, and lived till the 15th. Over the left ear there was a semicircular wound two inches and a-half long, from which thin pus exuded. The whole of the scalp was an inch thick with purulent infiltration, the cranial bones were uninjured. The right lung was quite collapsed; on the inferior surface of the middle lobe there was an obtuse angled rupture, two inches long, and one inch and a-half distant there was a second, the form and size of a hazel-nut. Twenty ounces of fluid blood lay in the pleural cavity. The inferior lobe of this lung was very emphysematous, and the parenchyma was completely broken up and strewn with blood coagula; this portion of the lung no longer floated in water. The uninjured left lung had more than the usual amount of cadaveric œdema. On the right arm there was an ecchymosis the size of the palm of the hand. These appearances justified us in subsequently denying the truth of the statement of the accused, that the deceased had only got "a blow" from his waggon, since the injuries of the head, chest and arm could not simultaneously have arisen from one blow, and the case resembled much more what usually happens in cases of death from being driven over by a vehicle.

CASE XL.—COMPLETE SEPARATION OF THE HEART BY A VIOLENT BLOW, FRACTURE OF ONE OF THE VERTEBRAL SPINOUS PROCESSES, LACERATION OF THE LUNG AND LIVER WITHOUT ANY EXTERNAL APPEARANCE OF INJURY.

Complete separation of the heart from its attachments is indubitably one of the rarest discoveries at an autopsy. A dealer in glass, aged 24, in crossing the heights of Spandau on a bitterly cold night in winter, had got off his waggon, heavily-laden with boxes of glass, for the purpose of leading his horse downhill; the waggon, however, began to slide and crushed the unfortunate man, unquestionably

with the greatest violence, against one of the poplars which there border the highway, and there he was found lying dead that same night by those who went out to seek him immediately on the wagon entering Charlottenburg without a driver. With the most important internal injuries here, there was externally visible—*Nothing*—save a trifling abrasion of the cuticle over the right cheek-bone, and a similar one upon the left arm. Who could have suspected what was found internally? On and in the head there was nothing remarkable, only that the *sinus transversalis* was more than usually full of blood. On opening the spinal canal in the neck, about a quart of dark fluid blood gradually escaped. The spinous process of the first thoracic vertebra was broken off and lay loose in the soft parts. The deep muscles of the back were ecchymosed down its whole length; the spinal marrow was uninjured. On opening the left thorax, about thirty ounces of dark fluid blood was found, but there was no heart in the usual position; on the contrary, it was lying loose at the bottom of the thoracic cavity, for the pericardium had been completely torn across, and the heart torn from the large blood-vessels. The terminations of the aorta and pulmonary artery could be clearly made out, the substance of the heart was dense and firm, and both sides, particularly the ventricles, contained much dark coagulated blood (*Vid.* page 25). The left lung was also torn almost across at its middle division, and finally, there was a laceration in the right lobe of the liver, two inches long, and half-an-inch deep! *and yet nothing was perceptible on the body externally!*

Case XLI.—Ill-treatment.—Fracture of five ribs, without any external appearance of injury.

The following case forms a chapter from the lowest life in Berlin. An extremely passionate man, M., lived in irregular wedlock with B., but also in a continual state of quarrelling and strife. On the morning of the 20th of December, B. was seen in a state of perfect health. At noon, a fellow-lodger on his return home, saw M. ill-treat B. in the most revolting manner, striking her alternately with his fist and with a wooden shoe, on the head, face, mouth, &c.; regardless of the presence of an eyewitness, he threw her on the table, and on the floor, and when she attempted to rise he seized her by the hair and threw her down again. An eyewitness saw from the court this poor tormented woman sitting in the afternoon on the

floor half-naked, her face streaming with blood, her mouth swollen, and her hair dishevelled. She saw M. knock her flat with a blow on the breast. B. then attempted to rise and go towards the stove, staggering as she went. M. again attacked her, threw her down backwards and kicked her on the belly and breast. At seven o'clock in the evening, the poor woman died. Assuredly, the abrasions and ecchymoses on the body were innumerable; there was an ecchymotic swelling of the eyelids, and a laceration of the mucous membrane of the lips, evidently produced by the blows of the wooden shoe. But it was a more important fact, however, that no external appearance revealed the existence of a fracture of the first five ribs of the right side, or of an extravasation of half-a-drachm of half-coagulated blood upon the *pons Varolii*. To this category also belongs the case already related (§ 27, page 64), of fracture of four ribs and rupture of the liver, without any external evidence of injury.

Case XLII.—Rupture of the Brain from being run over.—No external mark.

An aged tailor was run over and killed. The whole body, and particularly the head, evinced not the slightest trace of injury, and yet there was a fissure of the skull, extending from the end of the sagittal suture to the middle of the squamous portion of the left temporal bone; underneath this about an ounce and a-half of black coagulated blood lay over the brain, and beneath this there existed that most rare phenomenon, a rupture of the brain, about an inch in length and width, and filled with about two ounces of similar blood. The man had lived about seven hours, and had been cupped at the nape of the neck, as was proved by the marks on the body. Among many hundreds of medico-legal dissections, I have only seen this case, and one other, of rupture of the brain (*Vid.* Case CCCXVIII.). It is evident that this, as well as every other rupture of an internal organ, can only be produced by very considerable external violence, for *healthy* organs are never lacerated without it.

CASE XLIII.—FALL FROM A HEIGHT. FRACTURE OF THE SKULL, LACERATION OF THE PERICARDIUM, OF THE LIVER AND SPLEEN; INDENTATION OF SEVERAL RIBS.—NO EXTERNAL TRACE OF INJURY.

By a too common act of carelessness, a wealthy brewer met with a terrible death within the walls of his own extensive establishment. For a trap-door—leading from an upper story, by a shaft forty-six feet deep, to the cellar in which lay the great beer casks—having been left open, the unfortunate man fell through in the dark down the shaft, and, so soon as missed, he was drawn up dead. He was just forty-four years old. A great patch of the scalp covering the left half of the skull was torn off,—a proof that the man had fallen with his head upon some sharp edge, most probably that of one of the casks. The entire brain was covered with a layer of dark coagulated blood one line thick, and the lateral ventricles were filled with a similar extravasation. The base of the skull was fractured transversely, and completely split in two—a sufficient proof of the extraordinary force applied. Other evidence of a similar character was also afforded by the bursting of the pericardium throughout its entire length, the heart being, however, uninjured; by a transverse laceration of the liver, two inches long, in the inferior surface of the left lobe, and by a similar one in the spleen. Finally, the four first ribs on the left side were bent inwards. And in spite of all these dreadful internal injuries, the surface of the body displayed externally *not even a trace of ecchymosis*, neither over the indented ribs, nor over the liver or spleen.

CASE XLIV.—FALL FROM A HEIGHT. FRACTURE OF THE STERNUM, OF SEVERAL RIBS, AND OF A CERVICAL VERTEBRA; RUPTURE OF THE SPINAL MARROW AND OF THE LIVER, WITHOUT ANY EXTERNAL SIGNS.

A workman, aged 30, fell sixty feet into a limekiln, and lay senseless, and breathing stertorously, for three hours, when he expired. Except a few unimportant abrasions of the cuticle on the hands and inferior extremities, and a trifling ecchymosis on the back of the neck, there was neither any external trace of injury, nor any appearance leading to the supposition of internal injury. The autopsy revealed (1.) apoplectic hyperæmia, both of the cerebrum and of the cerebellum;

(2.) a fracture of the third cervical vertebra, the spinous process of which was also broken off; (3.) the spinal marrow was torn across at this spot, and the spinal canal filled with half-coagulated blood; (4.) the sternum was completely separated from its manubrium; and (5.) the second, third, and fourth ribs were fractured; finally (6.) there was a superficial T-shaped laceration of the right lobe of the liver, and (7.) a small rupture of the *lobulus quadratus*. (The superficial character of this laceration was a sufficient explanation of the small quantity of blood, only three ounces, poured into the abdominal cavity.)

Case XLV.—Death from a violent blow, rupture of the Liver.—Nothing anormal externally.

A girl, aged eleven, had gone into a mill, and was violently thrown from a beam against the wall. Death occurred one hour and a-half after. The body in this case also exhibited not the slightest trace of injury, and just because of this, and considering the cause of death and its suddenness, we were led to predict the rupture of some important organ. The autopsy revealed a longitudinal laceration in the liver six inches long, which had divided the right lobe from behind forwards. In the abdominal cavity there were seventeen ounces of partially coagulated blood.

Case XLVI.—Fall from a carriage, fracture of the sternum and of several ribs, rupture of the Liver.—No trace of injury externally.

This case exactly resembled the preceding. A coachman had fallen from his carriage during severe frost, and shortly after died. He was asserted to have died from "apoplexy," and "traces of external violence," were declared not to have been found on the body. And they were indeed so completely wanting, that for that reason alone we prognosticated an internal rupture, and we did so the more readily, that the corpse had a decided dirty greenish-white (hæmorrhagic) colour. The rupture of this perfectly healthy liver was of a most frightful extent, so that the fall must have been a most violent one. The right lobe of the liver was completely torn off, and a very large quantity of frozen blood lay in

the abdomen. The urinary bladder was full, and with its frozen contents lay like a solid ball in the pelvis. The sternum was completely broken across close below the manubrium, and the last five true ribs on the right side were also broken across. There was, however, no external trace of injury! I may also add, that the perfectly anæmic lungs were not frozen, but the brain, also anæmic, was frozen hard.*

(2.) Very frequently there is found on the bodies of men who have died a violent death, one or more suspicious-looking spots; these are chiefly seen on the forehead, face, superior and inferior extremities, the elbow, back of the hand, ankle, shinbone, &c.; they are small, from one-quarter or half-an-inch to three-quarters of an inch in diameter, usually circular in form, of a red or reddish-brown, or a dirty yellowish-brown, feeling and cutting more or less hard and leathery, displaying when cut perhaps a trifling congestion of the small cuticular vessels, often not even this, and never exhibiting any true ecchymosis. These spots may puzzle the medical jurist, and in fact, they require a most careful investigation and description in all cases of death under suspicious circumstances, the particulars of which have not yet been ascertained, as they may betoken some antecedent struggle, and may at any rate yield some information. But in most cases these *pseudo-ecchymoses* have a perfectly different signification, and careful attention will soon teach the medical jurist the difference, for in general they are but the results of blows and scratches received by the body in falling on some hard substance at the moment of death, and have, of course, not the slightest connection with the cause of death. Similar spots are often produced after death by rough handling of the body during transport, &c. Numerous experiments on the dead body, still continuously prosecuted, have made me perfectly certain of the possibility of producing such pseudo-ecchymoses even days after the death, and also other alterations of the cadaveric surface that might be readily confounded with the phenomena of living action. The sooner after the death the experiments are commenced the more striking are the phenomena observed. If any part of the dead body be firmly and for some time rubbed, so as to excoriate it, with a hard brush or coarse woollen

* See also numerous other cases of the most various and important injuries of both hard and soft parts, without any perceptible external trace of injury, in the illustrative cases, § 8, Special Division, particularly Cases LIV., LXXXVIII., XCI., XCIII., XCV., XCVI., XCVII., CIII., &c.

rag, or if the body be pulled about upon a rough floor, and examined twenty-four to thirty-six hours afterwards, phenomena are often observed, which might indubitably be held to be the result of living action, bright cinnabar-red patches forming a striking contrast to the surrounding cadaveric pallor, dirty yellowish-brown epidermic crusts, that cut dry and hard, &c. The results of such experiments testify that the explanation, already given, of the mode of origin of these common cadaveric phenomena, is at once natural and true (*Vid.* Plate V., Fig. 14). Engel has made some similar experiments perfectly confirmatory of mine, and any one may repeat them with the same result. He says,* "If any part of the skin of a corpse be excoriated, that is, if the epidermis be removed from it by continued friction, evaporation from its surface is thereby favoured, and it acquires the possibility of drying better and more quickly than any other part of the skin not so treated; it acquires, in fact, all the peculiarities observed in a patch of skin altered by friction during life, for similar conditions, are present in both, giving rise to the possibility of a rapid desiccation. The colour of any part of the skin of a dead body so treated may be varied according to desire. If the excoriation is produced on any part of the body on which hypostases cannot form, then, as is usual in parts altered by friction, the desiccated skin becomes of a clear yellowish-brown, transparent at the edges. But if on the contrary, the excoriation is made on a spot on which hypostases already exist, or may subsequently form, then it becomes gradually of a blackish-brown colour. In neither of these cases can the excoriation produced after death be distinguished from one that has been made during life." We cannot be too urgent in directing attention to these results of experience and observation, for the cases are innumerable in which from ignorance or neglect of them, the most important conclusions have been erroneously arrived at. Intimately connected with this matter is the query:—

(3.) Whether wounds observed on the body have been produced *during life or after death?* When we reflect how seldom there is any opportunity for obtaining experience on the great scale in medico-legal matters, we can the more readily excuse the amount of error that has crept into the medico-legal science and practice, that has been handed down from handbook to handbook, from teacher to scholar, till it has spread from one court of medical inquiry to

* *Op. cit.* p. 322.

another; and if this has been the case in any one point, it has been pre-eminently so in regard to the question now before us. It has been theoretically assumed, and it is so stated in the best handbooks, that wounds inflicted during life are very readily distinguished from such as have been inflicted after death, by the entire absence of any of the usual signs of vital reaction, as inflammation, hæmorrhage, suppuration, swelling or cicatrization of the edges of the wound, granulation, &c., and every one that has ever cut or stabbed a dead body, thinks he has obtained positive proof of the correctness of this opinion—and this opinion is indubitably correct, when regarded as affirmative (that the wound has been inflicted during life), though even in this case it may not be superfluous to recite a few of the limitations to which experience has taught us that it is liable. Inflammation, ecchymosis of the lips of the wound, and suppuration can, of course, never be observed on a wound inflicted on a corpse, but in very fat subjects, it not infrequently happens that in wounds, particularly incised wounds inflicted after death, when the body begins to swell, the subcutaneous fat protrudes, and the edges become more or less everted, so that a certain amount of doubt may thereby be thrown over the time when the wound was inflicted, and this doubt may be much increased if any blood be observed trickling from the wound, which may readily be the case should the wound be situated on any depending part, and should the blood be peculiarly fluid. If this experiment be made on several bodies in which these conditions concur, if they be allowed to lie one or two days, and the condition of the wounds then examined, these statements will be found perfectly confirmed. If the bodies, however, be allowed to lie for whole weeks or months, then we will find something else. From the very nature of the subject, the experiment cannot of course be so carried out, but medico-legal practice exhibits after a different fashion similar results. I refer to the case of bodies that have lain long unsuspected in some certain place, particularly in the water, and are already putrid when first discovered. In such cases we have the whole surface, or perhaps only that part in which the injury is, green, greyish-green, denuded of its epidermis, large venous cords filled with decomposed blood course across the part, the edges of the wound are soft and spongy, fat and serum well out from between them; and I can testify that the most experienced hand may well hesitate in such a case to decide from a mere external examination, whether the wound has been inflicted during life or after death, and

may think himself lucky should the further internal examination of the case throw any light upon this point, which is by no means always the case. In other cases again, the facts may be obscured after a different fashion, by the burning of the body, or by the burning or singeing of that part of the body in which the injury is situated; and this is not a very rare occurrence. In such a case it is difficult, or impossible, to investigate the condition of the edges or bottom of the wound, because both it and the neighbouring parts are completely charred, and should the further examination afford no information, the matter must for ever remain obscure. But if from this we find that the opinion already given of the diagnostic value of the phenomena of reaction is subject to limitations which have not hitherto been related, so we also find from other circumstances, that this opinion, taken in its *negative* sense, is utterly untrue. It is assumed to be easy to distinguish injuries inflicted during life from such as have been inflicted after death, regarding those injuries as most certainly belonging to the latter category, in which there are *no* visible traces of reaction, no trace of ecchymosis of the edges of the wound, of inflammatory areola, of suppuration, &c., and yet cases do occur perfectly contradictory of all this, and in certain circumstances which we shall presently describe, such cases constantly occur. We have already, in the second subdivision (2) of this paragraph, been taught the great similarity which may subsist between injuries inflicted during life and those which have been inflicted after death. And this similarity is much greater and more liable to lead to error, when death has instantaneously followed the injury inflicted during life, as in the case of punctured, incised, or contused wounds implicating any important vessel, as the carotid artery, jugular vein, &c., or any vital organ, as the heart or lungs, in a serious manner. In such a case the wounded person does not, properly speaking, die, that is, there is in such a case no agony—no act of dying, so to speak—interposed between life and death; he is alive and is dead in the same instant of time, or within, at most, but a few seconds. One would, *à priori*, expect that in such a case there could not be any trace of reaction, even as evinced by ecchymosis of the edges of the wound, to say nothing of swelling, suppuration, &c.; and experience confirms this in a most remarkable manner, inasmuch as it shows that these wounds are of such a character, that if after the conclusion of the autopsy, a similar wound be made purposely in the neighbourhood, it is perfectly impossible to distinguish the one from the other.

In considering all we have said under this head, we must, therefore, always remember, that IT IS BY NO MEANS EASY IN ALL CASES TO DISTINGUISH BETWEEN INJURIES INFLICTED DURING LIFE AND THOSE INFLICTED AFTER DEATH. I need not proceed to prove the practical importance of this doctrine, nor to show that injuries to the dead, particularly in the case of those drowned, buried, or found in privies or dungheaps, are often produced by the instruments employed for their removal from these situations, and in every such case this question must be decided. The following cases afford proof of the truth of the doctrine I have just laid down.

CASE XLVII.—PENETRATING WOUND OF THE STERNUM BY A STAB. —WOUND OF THE ARCH OF THE AORTA.

One Siegel, a labourer, and formerly an executioner, had been scornfully abandoned by his wife, and every attempt to pacify her and induce her again to live with him was fruitless; so he decided to make one more trial, and if that failed, to kill her, and this he did, stabbing her in the breast with an ordinary tableknife and saying, "Now, you have your deserts." S. repeatedly assured me while in prison, that the knife went in as into "butter," and yet it had in a most unheard-of manner made a wound one inch in length right through the sternum. The edges of the wound in the bone were quite smooth, without a trace of splintering. In the thoracic cavity, taking both pleural sacs together, there was about one pint of dark fluid partially coagulated blood, and about eight ounces of coagulated blood in the pericardium. The knife had gone straight through the right lung just where the large vessels enter it, had also penetrated the pericardium and the arch of the aorta, five-fourths of an inch above its origin from the heart. The wound in the aorta was slightly rounded (halfmoon shaped), half-an-inch long, with clean and feebly-bluish edges, the posterior wall of the arch of the aorta also exhibited a precisely similar sickle-shaped wound with clean bluish edges, so that the knife had completely penetrated the arch of the aorta as well as the sternum. The murdered woman gave one shriek and fell dead on the ground, and yet in this case, also, we found the blood coagulated (*Vid.* § 11, page 23). The external appearance of the wound was remarkable, it was situated between the first and second ribs on the left side, close to their junction with the sternum, extended obliquely inwards, was three-quarters of an inch

long, half-an-inch broad, acutê angled, and its edges clean, smooth, not inflamed, and without a trace of ecchymosis, it was also wholly without any trace of fluid or dried blood about it, so that in all respects it perfectly resembled a wound inflicted on a dead body. The non-correspondence of the external with the internal wound arose from the oblique direction in which the deceased had been standing when she received the wound, whilst of course at the dissection she was placed flat on her back, and the external coverings had been thereby displaced.

Case XLVIII.—Stab with a knife in the Lung.

A boy, aged 14, was stabbed in the back by his enraged and half-drunk stepmother with the knife with which she had just been killing a fish, a few minutes afterwards he fell *fainting* on the floor, and died six hours after. The wound in the back was ten lines long, gaping slightly in the middle where it measured three lines across, its edges were clean and smooth, perfectly free from ecchymosis, soft and dry, just such edges in short as would have existed in a wound made upon a corpse. The cause of death was internal hæmorrhage from a wound which had penetrated one inch and a-half into the inferior lobe of the left lung, and in the left pleural cavity we found about four pounds of dark fluid blood containing some coagula. We also found of course a state of general anæmia, to which, however, the posterior cerebral veins and sinus presented the usual exception. (*Vid.* Death from Hæmorrhage, § 21, Special Division.)

Case XLIX.—Stab with a dagger in the Lung.

This was indeed a most mournful case! At a family feast a large quantity of Bavarian beer was drunk. The brother-in-law of the landlord became quite stupid from its effects, wandered into the kitchen and there laid hold of a broken militia sword, one foot long and half-an-inch broad, which was used for toasting herrings, and had been for this purpose ground to a sharp point, with this he returned to the room and reeled about brandishing it. His brother-in-law went up to him, the drunken man put his arms round him, and in doing so stabbed him in the back. The wounded man died in three-

quarters of an hour. The body was of a waxy-white. At the inner edge of the right shoulder-blade we found a gaping wound one-quarter of an inch long and one-third of an inch wide, with its edges clean, smooth, quite dry, of a deadly paleness, and wholly without ecchymosis. In the right pleural cavity there was one quart and a-half of partly coagulated, but mostly fluid, dark blood, the superior lobe of the right lung was horizontally perforated by a wound which went right through the intercostal muscles between the second and third ribs, and ended in the subcutaneous cellular tissue above them. The body was of course perfectly anæmic, the only exception being the veins of the *pia mater*.

Case L.—Gun-shot wound of the Spinal Marrow.

On the 16th of October, 1848, there was a great popular outbreak at Berlin, attended by an obstinate barricade fight between the rioters and the city militia, which cost the lives of eleven men, one only of whom died an honourable death in the discharge of his duty; he was one of the city militia shot on the barricade, which he had already half surmounted; the fatal shot came from behind and below; it had entered about the seventh cervical vertebra, had shattered in pieces the three lowest cervical vertebræ, had torn across the spinal cord, and finally escaped at the angle of the right lower jaw by an angular opening about the size of a sixpence, which seemed to be caused by a conical bullet; neither the edges of the wound of entrance, nor those of that of exit were ecchymosed, a circumstance readily explicable by reference to the instantaneous death which must have followed the laceration of the cervical spinal marrow, and they differed in no respect from the edges of gun-shot wounds which we have made on dead bodies in the course of our experiments. Precisely similar results were found in the following

Case LI.—Gun-shot wound of the Lung,

In which a man, during one of the popular outbreaks of 1848, received a bullet right through his body, which perforated the inferior lobe of the left lung. In this case, also, of sudden hæmorrhagic death, both the wound of entrance and of exit had the exact appearance of those of a gun-shot wound inflicted on a corpse.

(4.) Very frequently the wounds found on the dead body are such as have been produced professionally and *secundum artem*, from leech bites, recent wounds from cupping instruments, recent venesection wounds, up to surgical sutures, incisions, crucial incisions, and amputation wounds generally (in this category must also be included all traces of attempts at revivification). It is usually sufficient to describe such wounds summarily in the protocol, but of course, where the medical treatment has become the object of complaint and inquiry, it is necessary to describe most accurately every such wound, even a venesection wound, should it have been stated to have been the cause of death. To this category also belong, as already mentioned, all such injuries as may be inflicted on dead bodies by the means used to secure them, or by the gnawing of predatory animals. Such easily recognised injuries are specially found on all bodies, whether adult or infantile, that have been dragged from the water by pikes or hooks, &c., or that have been attacked by the voracious water-rats (*Vid.* § 57, under subsection (No. 22.), and § 120, Special Division).

(5.) Finally, those cases, the most numerous by far, remain to be considered, in which the wounds themselves must, *à priori*, be looked upon as the cause of death. § 19 of the "regulations" already quoted, lays down the procedure to be followed in such a case, and to these we have only the following additions to make. Even science cannot but approve, when the present "regulations" require that "in the case of wounds and injuries of the dead body, which have evidently no connection with the cause of death," "only a *summary* description of their appearance is to be given," and also when they further permit "the general appearance of ecchymoses, excoriated patches of skin, &c., which have also apparently no connection with the cause of death, to be compared with well known bodies, such as pieces of money, fruit, &c." The scientific determination of the cause of death, is never fortified by any of these accessory appearances. Sometimes cases occur, particularly where murder has been preceded by a violent struggle (Case LXX.), or where the person has died from a multiplicity of injuries (Case LXI.), in which such a number of external injuries exist, that examples of every class, solutions of continuity, excoriations, cuticular abrasions, ecchymoses, &c., may be reckoned by the dozen. In such a case the protocol of the autopsy may be made to consist of a

hundred or more subsections (under different numerals), and this must be avoided in every case (*Vid.* § 50), because a too minutely accurate description of every anormality, even if it were possible, would seriously interfere with the distinctness of the report; the autopsy conducted in such a manner would further occupy a most unreasonable time, and, what is of more importance, such an absurdly careful description would be of no use after all, since it could not assist in throwing light upon the case, but would rather indeed, in most cases, obscure it. In such a case it is sufficient to make an accurate examination and description of the more important of such injuries and anormalties, of those which most evidently appear of consequence for the correct elucidation of the case, and then to give a more summary description of the rest, which may be conveniently slumped together after this fashion, "ten or fifteen patches precisely similar to that described were visible upon—." We must now say a few words regarding the *marks of the rod,* which not infrequently require to be investigated in cases of the death of children from ill-treatment. Marks of the rod are recognisable on the dead body in a twofold manner. Either we find, where the birch has been flatly laid on, two, three, or four parallel running stripes, which may be shorter or longer, up to two or three inches long, and are red and slightly ecchymosed, or we find, when the rod has struck more with the point, a number of large ecchymosed spots on the part struck; these resemble ordinary petechiæ very much, but can readily be distinguished from them by being confined to one part of the body, usually the back and hips. In the longer stripes small abrasions of the cuticle are sometimes found, but I have never observed upon bodies any more serious injuries as the result of the rod as commonly used among us for the purpose of correction.* Finally, in examining solutions of continuity, the "regulations" permit the "careful introduction of the probe," where the medical inspectors consider it necessary, but to prevent any abuse of this permission they very properly require the reason for this procedure to be explicitly stated in the protocol. Probing

* In the admirably conducted Marine Hospital at Cronstadt (in Russia) I have seen a culprit lying on his belly, who, eight days previously, had run the gauntlet, and received *twelve hundred stripes,*—a smaller dose of the same was even then awaiting him! His back was entirely covered with superficial ulcers: his general condition was, however, perfectly satisfactory.

is, however, in fact, perfectly superfluous in most cases, since the depth of a wound is easily ascertained without it, when we proceed to the internal examination of the body and of the part injured. But it is not only not improper, but actually necessary, after correctly examining and describing the original injury, to open it up in order to examine the internal condition of its edges, as also that of the subcutaneous cellular tissue, and I may now again reiterate the necessity of incising every seeming ecchymosis, in order to discriminate them from post-mortem and other stains (*Vid.* § 8).

CHAPTER II.

INSPECTION OF THE WEAPONS.

Statutory Regulations.

PENAL CODE, § 162. *In every case the opinion of the experts must be taken as to the weapons with which the injuries might have been inflicted, any weapons found must be laid before them, and they must be interrogated whether the wounds might have been caused by such weapons, and whether any conclusions as to the mode in which the perpetrator had acted, as to his object and bodily strength, can be drawn from the position and size of the wounds.*

§ 34. CLASSIFICATION OF WEAPONS.

Judicial Medicine has nothing whatever to do with the ancient legal classification of weapons into lethal and non-lethal. It cannot be too often repeated, nor too strongly impressed on the mind, that an expert in natural science called to the assistance of the Judge, has nothing whatever to do with the arguments, discussions, or definitions of purely legal science. However useful for a Judge it may be to classify weapons into lethal and non-lethal, such a classification is, from a medical point of view, simply absurd; and in judicial medicine, only such a classification is likely to prove serviceable as shall arrange the various weapons, and modes of producing death, under the heads of their various actions on the animal economy, as from these actions we can in unexplained cases, during life or after death, infer the nature of the weapon so employed. It is obvious, therefore, that the simplest classification of instruments capable of producing injury is into (1.) sharp, (2.) blunt, (3.) fire-arms, and (4.) instruments capable of producing strangulation.

§ 35. SHARP-WEAPONS.

Under this head must be included every kind of one-edged cutting

instrument, as a razor, every kind of one-edged and sharp-pointed instrument, as most table and pocket-knives, every kind of double-edged cutting instrument which are usually also sharp-pointed, as daggers, stilettos, cane-swords, and rapiers; every kind of three-edged weapon, as sharp bodkins and bayonets; all weapons whose cutting edge is more or less straight; also every kind of cutting weapon with a more or less crooked or halfmoon-shaped edge, as sabres, scythes, and sickles; to this category also belong sharp pieces of glass and metal. We have had occasion to investigate wounds made with all these weapons, as the reader will, to some extent at least, be able to perceive from the cases given.

Contused wounds inflicted by such weapons may be superficial or deep. When recently given, their edges are certainly smooth, when the weapon has been recently sharpened, but still always more or less contused at the external surface. The reactive phenomena depend, of course, upon the part where the blow was struck, and the results found, upon the time elapsed between the infliction of the wound and its examination, whether that take place during life or after death. When such wounds reach the bones, they either splinter them or divide them cleanly, and the latter is specially apt to occur in the case of the larger and smaller long bones, as the fingers, arm bones, &c. Both kinds of injury, splintered fracture or clean division, can also be produced by cuts inflicted on the skull. The following case shows that even the short Prussian infantry side-arm, wielded with sufficient strength, is able to cut completely through the skull.

Case LII.—Sabre-cut fatal from penetration of the Skull.

In a quarrel betwixt civilians and soldiery, a workman aged 42, received a cut across the head from the sharp sabre of an infantry soldier. The cut extended three inches and a-half from the sagittal suture towards the left parietal bone, and this bone was towards the middle of the cut completely divided to the extent of one inch. The internal or vitreous table was splintered in every direction round the wound, and the coverings of the brain cleanly divided to the extent of one inch. At this spot there was an abscess the size of a walnut which contained splinters of the vitreous table. Recent leech bites over the upper part of the abdomen showed that the deceased must have complained of pain in this region, and this was probably refer-

rible to a tuberculosis of the liver, which was revealed on dissection.* Contused wounds have this peculiarity, which is deserving of attention, that they almost never represent the exact dimensions of the weapon employed, and do not therefore contribute any data for estimating its nature. And in this respect an important difference obtains when muscular parts have been divided in the longitudinal direction of the fibres or across them, in which latter case a gaping wound is left, differing very much from the dimensions of the weapon employed.

Incised Wounds may be superficial or deep, and have sharp smooth edges nowhere contused, which converge to an acute angle at both ends. The reactive phenomena resemble those in contused wounds. They may, as is well known, occasion important and fatal hæmorrhage, when they implicate any considerable vessel that may be directly beneath the skin. It is extremely difficult, and often impossible, to determine, when such is necessary (as, for example, in cases of doubtful suicide), where the incision commences or where it ends? whether it runs from right to left or the reverse? This question is specially apt to arise in cases of cut-throat. Stains of blood on the one hand and not on the other, incisions in some articles of clothing on the one side and not on the other, and similar accessory circumstances often afford an explanation in such cases.

Cases of cut-throat may in certain circumstances give rise to another perplexing phenomenon, extremely apt to mislead, as I have seen in one remarkable case, which I helped to unriddle; where, for instance, the incision has been made across a neck covered with those numerous folds, so common in aged or meagre persons, with the head bent forwards; on the neck of the corpse being stretched or bent backwards, there is no longer apparent only one continuous incision, but several interrupted ones, often tolerably distant from each other, just as we see more plainly in a piece of cloth which has been folded, cut, and then unfolded. The medical inspection in a case of this nature (No. XXXII., already detailed), had made "four incised wounds" of the one which really existed, and supposed they had demonstrated a murder, and that the murderer had made several attempts to complete the cutting of the throat!

Punctured wounds occasion but little external hæmorrhage, except

* Two other examples of division of the cranial bones by sabre-cuts will be found in Cases LXIII. and LXIV. Another case of a fatal sabre-cut upon the head, though not related here, will be found among the second hundred of my Gerichtliche Sectionen, s. 49.

in such situations as the neck, where large blood-vessels lie near the surface, and if they are of small size are attended by the most trifling reactionary phenomena. But, on the contrary, when such wounds penetrate deeply they give rise to the most considerable internal effusions of blood, urine, the remains of food, &c.; and in regard to this there is one point to which I must direct attention, inasmuch as it is essentially a practical one, and appears quite different when regarded from the two opposite points of view of the study and the dissecting table. Nothing is more common, for example, than to blame the medical jurists for not ascertaining the precise source, place, or vessel, from which internal hæmorrhage has proceeded in cases of penetrating wounds. But this is frequently most undeserved; for in many cases it is either perfectly impossible to ascertain this, or it can only be ascertained after a most laborious examination, by first removing all the internal organs and then introducing a blow-pipe into the principal vessel, and such a waste of time serves, after all, in general, no practical end, for the internal hæmorrhage being the indubitable cause of death, the circumstances of the case may render it perpectly unimportant, in a legal point of view, to ascertain from what vessel it has originated. I need scarcely, however, state, that cases of an opposite nature do sometimes occur. *Punctured wounds* also seldom represent the exact dimensions of the weapon employed, because the weapon is so forced through the skin and superficial muscles that any comparison between it and the wound made may lead to erroneous conclusions. Moreover, in all punctured, contused, or incised wounds, any comparison of the wound with the weapon supposed to have produced it cannot, of course, lead to any correct conclusions, when the person wounded has died after the commencement of granulation or cicatrization,—a circumstance that frequently occurs after injuries of the head.

Scratches, or the marks of finger-nails, are found on the body in a twofold form. Should strong pressure alone have been made by the nails, then we find, even when true ecchymosis has not occurred, a semicircular, more or less reddened, and feebly ecchymosed stripe, which exactly points out by its situation and direction the position in which the finger or fingers have been applied, a point of considerable importance in cases of strangulation, or of doubtful self-delivery. If the nails have been used to scratch more than to squeeze, the cuticle is found to be peeled off, the skin beneath being sometimes of a bright-red, and sometimes not remarkable at all in its appear-

ance. The whole spot is usually not larger than a lentil, so that an excoriation thus produced is readily distinguished from that produced by any other cause. Case CCLXXXIII. well exhibits how much practical importance may become attached to even the most trifling appearances on the dead body. The marks of scratches were found upon the neck of the person strangled. But inasmuch as the individual then suspected of the murder (which he afterwards confessed, and for which he was executed) had on both his hands deformed and stunted nails, which were only half the usual length, and did not reach the ends of his fingers, we were obliged to conclude that the scratches could not have been made with *these* nails, and that he must, therefore, have had an accomplice at the commission of the deed. At first the accused stoutly denied this, out of pity for his partner in crime, a boy, but he afterwards confessed that this had really been the case.

§ 36. Blunt Weapons.

Blunt weapons may be followed by the utmost variety of external and internal results, according to the force with which they have been wielded, and the part on which the blow has been struck. Blows from such weapons occasion concussion of enclosed organs, and may thereby produce death instantaneously (as in the case of severe concussion of the brain, spinal cord, or heart), or more or less rapidly by the rupture of vessels or vascular organs from the concussion. They may also cause fracture of the bones, from its simplest form up to complete comminution of the entire skeleton. Blows from such weapons may also divide the soft parts, making wounds with obtuse, irregular, serrated, lacerated, and more or less contused edges, *often widely differing in form from the weapon that has produced them*, because the soft parts have been lacerated by the blow,—a circumstance deserving of remembrance in every such case. In other circumstances such blows contuse and disfigure, by flattening, as in the case of the nose and ears, by causing swelling, as in the case of the eyelids and lips, or by fracturing those bones which give the form, as in the case of the face. It frequently happens that one body affords examples of several of these varieties of wounds, either because several blunt weapons have been used, by one or more assailants, or because one and the same weapon, a hatchet, or other instrument possessing different faces, blunt, sharp, or angular, has

been employed. A great variety in the nature of the wounds is most commonly found after death, from repeated inhuman acts of violence, and after murders committed by men of peculiarly ferocious character, as several of the examples given in § 41 will abundantly prove. As to the kinds of blunt weapons, and forms of violence employed, these occur in every possible variety. From what I have seen in the course of my own practice alone, I can enumerate, adzes, axes, blunt sabres, every kind of hammer, paving stones, cudgels, broken jugs, and large beer-glasses, beams, logs of wood, wooden shoes, wheels, windmill sails, masts, the butt-end of guns, iron hooks, waggons and railroad trains, the fists, teeth, feet, &c., since every kind of blow or fall comes under this category. As already remarked, one result, by no means rare, of the employment of such blunt weapons or modes of injury, is the rupture of some internal organ. Healthy organs, lungs, heart, &c., never rupture spontaneously, the ruptured lung of a pthisical person has been tuberculous and cavernous, and a ruptured heart has also been either atrophied or hypertrophied, &c. And even healthy organs are never ruptured, but by the employment of very considerable violence. Therefore, fissures in the *basis cranii*, rupture of the liver, lungs, &c., may uniformly be taken as conclusive evidence of the previous application of great violence. The following are the observations I have made on each of these individually :—

Fissures of the base of the skull are always transverse. In a very numerous series of cranial injuries, I have never once seen a true longitudinal fissure. They are most generally found in the anterior third of the cavity, and usually extend from the *pars petrosa* of one temporal bone to the *sella turcica*, or across it to the *pars petrosa* on the opposite side. We shall consider subsequently the fractures of the rest of the cranial bones.

Rupture of the brain is uncommonly rare, at least I have only seen it twice, once in the case of a man run over by a carriage (*Vid.* Case XLII.), and another time, following a contusion (*Vid.* Case CCCXVIII.). Also—

Rupture of the lungs, is by no means frequent. It may occur in any one of the lobes of either lung, and in every possible direction and situation (Cases XXX., XL., and XCIII.).

Laceration of the trachea, and *œsophagus*, are extremely rare (Case XCII.), and are produced only by contusions of the utmost violence. I have already related cases of these great varieties.

Rupture of the pericardium, and *rupture of the heart* (Cases XXXIX. and XLIII.). In the one case the fall from a great height, in the other, the being violently crushed against the stem of a tree violently concussed the body, and death was of course all the more instantaneous in each case, from the coetaneous occurrence of other important injuries.

Rupture of the liver, is not only the most frequent of all organic ruptures, but is indeed by no means of infrequent occurrence (*Vid.* Cases XXXIV., XXXVII., XL., XLIII.—XLVI., and LIV., XCIII., and XCVI.). In almost every case the rupture is longitudinal, and either occurs in the right or left lobe, or between them, or, as I have seen in a few instances, it may occur in the form of several small longitudinal lacerations in both lobes. Transverse lacerations of the liver are extremely rare, and when they do occur it is not usually as one single laceration of considerable size, but several small isolated ruptures are found near one another. But

Case LIII.—Rare Form of Rupture of the Liver.

I have once seen a peculiar form of rupture of the liver in the case of a boy, aged two years and a-half, killed by being driven over, who lived half-an-hour after the accident. A reddish-brown stripe half-an-inch broad, cutting like parchment, extended from the middle of the abdomen to the third lumbar vertebra. In the abdominal cavity there were four ounces of dark fluid blood effused, which had escaped from a laceration of the liver, of so peculiar a character, that the entire edge of the right lobe seemed as if it had been gnawed by animals. The peritoneal folds in the pelvis were also much ecchymosed, while the rest of the body was of course anæmic. The *vena cava* was empty, the heart empty, the lungs, as in every case of anæmia, of a greyish-white colour. The veins of the *pia mater,* however, as usual, did not partake in the general want of blood.

The following is also an extremely rare case:—

Case LIV.—Complete separation of the Liver.

A girl, aged four, was run over by a vehicle, and died in a few minutes. Externally there were no traces of any important injury visible (page 109), a trifling ecchymosis on the left side of the forehead, on the right forearm, and a more strongly marked ecchymosed

stripe on the left leg, nothing else. From the suddenness of the death, therefore, and the circumstances in which it had occurred, a rupture of the liver or spleen was to be expected. The liver was found to be ruptured, in a manner I had never previously seen, not only transversely, but so completely torn through that the anterior portion lay loose in the abdominal cavity. The spleen had also two transverse lacerations in its substance, but they did not pass beyond its centre. In the abdominal cavity there was a pound of fluid blood. With the exception of *ruptures of the uterus* during labour, and *ruptures of the spleen*, which, when they do occur, are usually transverse (*Vid.* Cases XXXIV., LIV., XCI., XCVII., and CIII.), ruptures of the other abdominal organs are almost never observed. Amongst these we include lacerations of the stomach, of the intestinal canal (Case XCVII.), of the omentum (*Ibidem*), of the kidneys, of the large blood-vessels, and the urinary bladder, which seldom occur except in cases of general crushing of the body. Devergie indeed supposes, that ruptures of the urinary bladder are "tolerably frequent," but in support of this remarkable opinion, he quotes not one case from personal observation, but only gives in a few words two cases observed by others, and these not minutely described. I have never observed on the dead body a single case of rupture of the bladder, whether full or empty, in the latter case, in truth, the accident could not happen without complete destruction of the pelvis.

§ 37. Firearms.

To this category belong one- and two-barrelled pocket-pistols, pistols, rifles, guns, and muskets (cannons and mortars, which Devergie also reckons do not belong to the department of juridical medicine!). Shots from such weapons destroy the continuity of the parts, partly by perforating both hard and soft tissues, partly by contusing and lacerating them, and are fatal either by thus destroying important organs, as the brain, or by hæmorrhage. The firearms themselves are very rarely required to be examined by the medical jurist. For, on the one hand, the weapon is seldom found by the body found shot, because the murderer does not leave it lying, and the suicide may be robbed of it after death; and, on the other hand, cases (of gunshot) where the circumstances are, *à priori*, sufficient to prove them suicidal, do not come under the cognizance of the medical

jurist; and, finally, it is but rarely, in our experience, even in cases of certain or suspected murder, that the inspection and examination of the weapon, where it is found, is of any judicial importance. In order to be able, if necessary, to answer the question, whether, and when a weapon has been fired? M. Boutigny, an apothecary in Evreux,* has experimented on the residuum of the powder left adhering to the locks of firearms discharged at different periods; his results are mainly as follow:—First period. This lasts but two hours after the discharge of the piece. The adhering residuum is of a blackish-blue colour, without any crystalline constituent, and without any red oxide or other salt of iron, sulphur is, however, present, and the solution of this dirty residuum has the smell of ambergris. The second period lasts twenty-four hours:—The colour of the fouling is less dark, its solution is clear, no sulphur, no crystals, and no red oxide of iron is present, but traces of a salt of iron are found. Third period:—This lasts for ten days, and is characterized by the presence of small crystals, in the priming pan, and particularly under the hammer and flint. Towards the end of this period the crystals become always larger. On the part of the barrel opposite the pan, and in the pan itself, numerous spots of the red oxide of iron are visible. Testing with Tincture of Galls, and with Ferrocyanide of Potassium shows the presence of a salt of iron. Fourth period:—This lasts till the fifteenth day, and differs only from the third in that the quantity of the salt of iron on the barrel gradually diminishes (!), while the red oxide increases. Orfila does not hesitate to say respecting these experiments, "it is thus possible to determine, within a few days, or even within a few hours, how long it has been since any firearm has been discharged." I, for my part, am far from sharing this opinion. For we dare not attribute such importance and probative power, especially in such a case as this, where the life of the accused may depend upon it, to the isolated and unconfirmed experiments of a man unknown to science. Moreover, the extreme distinctness with which Boutigny lays down the results of his experiments, makes them look all the more suspicious. For it is evident that a difference in the quality of the powder must make a difference in the residuum adhering to the weapon, since the amount of nitre varies from 62 to 76 per cent., the amount of charcoal from 12 to 18 per cent., and the sulphur from 10 to 20 per cent. The varying degree of humidity

* Journ. de Chim. Med., 1833, Septembre.

of the atmosphere will also produce other variations; and, moreover, the discovery of percussion caps and gun-cotton has completely altered the point of view from which this question must be examined, and has introduced new elements into its consideration. But I must further remark, that these questions *belong not to the province of the physician, as such*—and if he be not, perchance, a skilful sportsman and experienced in firearms, he cannot be considered *a competent expert* in such matters, and it is his duty to refer them, if the judge himself do not do so, to gunsmiths, foresters, gamekeepers, and the like. How often will it not happen that among the twelve jurymen there are one or more experienced sportsmen, and how much better will the physician maintain his own position in their eyes by at once declaring that he is no authority in such matters, than, by retailing opinions obtained from books, which one author has, without examination, copied from another, thus displaying his own ignorance of the subject to those who really understand it, and rendering the rest of his evidence doubtful in the eyes of the jury! The case is different in respect to the action of firearms on the body; here the physician is a competent witness, for here we have to do with the observation of a natural object within the compass of his science. Besides what we have already said respecting the general action of firearms, there yet remains to be considered the recent invention of conical bullets, the condition of the edges of the wounds of entrance and of exit, the course taken by the bullet, the action of double-barrelled weapons, revolvers, &c.; but these objects will be most appropriately treated when we come to speak of the mode of death following gun-shot wounds (Spec. Div., § 10, &c).

§ 38. Instruments capable of producing Strangulation.

There is no long, limber, and tough substance, which has not been employed to produce strangulation; cord, rope, kerchiefs of every form and stuff, girdles, leathern braces, twisted straw-bands, venesection bandages, sleeves of jackets, and legs of trousers, &c. Such instruments, act as is well-known, by closing the air-passages, by constricting the important vessels of the neck and stopping the circulation through them, or by paralysing important nerves by compression. Their local action on the neck produces the *mark of the ligature*, and as this is an important matter in determining

whether death has been caused by hanging, or whether the body has only been suspended after death, we shall consider it more at large under the head of Death by Hanging (*Vid.* Special Division, §§ 44, &c). The inspection of the cord, &c., is frequently required of the medical jurist, that he may determine whether such a ligature is capable of producing the mark discovered. I can state with certainty, as the result of a large number of observations, that this determination may often be attended with the utmost difficulty, if it be not steadily remembered that every possible variety of ligature may produce every possible kind of mark, for experience teaches us that this is the truth. In general, indeed, rough and hard substances, as hempen cords, leave upon the neck a mark exhibiting here and there trifling excoriations, and patches of mummified (parchment-like) skin, whilst the mark left by softer substances, as silken or woollen kerchiefs, and similar articles, exhibits this appearance much more rarely, but by no means never. Experience also teaches that the breadth of the mark left generally corresponds with the breadth (diameter) of the ligature, rope, &c., employed. But there are numerous exceptions to these rules; kerchiefs of silk, &c., are, no doubt, soft and elastic in themselves, but they are often edged with hard substances, as lace fringes, crôchet borders, &c., and these hard edges may come to lie directly on the skin and so compress and ruffle it. On the other hand, broad ligatures, as girdles and trouser suspenders, may produce quite narrow marks, because in this respect much depends upon the situation and position of the body during the hanging; should the body of the deceased, for instance, be only lying in the noose of a broad ligature, it is evident that this may easily tilt over and come to press with its narrow edge alone, and such cases are by no means rare. Finally, the relation which the mark bears to the ligature, as to depth, varies very much according to the degree of constriction of the neck. I have often enough seen this so tight that it was impossible to introduce a finger between the ligature and the neck, while in most cases the ligature is loose, and is yet sufficiently tight to produce death when the weight of the body is suspended in it. Every case of this nature brought up for medico-legal examination must rest upon its own merits, and requires the most careful consideration, lest an unfounded opinion may be incautiously given, which may be fraught with important consequences for the accused. We shall consider further the subject of the mark of the ligature,

which is by no means exhausted, when we come to treat of Death by Hanging. The examination of the ligature may, however, be of importance in another respect, in cases, for instance, where it is doubtful whether the case is one of murder or suicide; the nature of the knot tied may be very significant, as it may belong to one or other of the numerous technical knots—such as the baker's knot, with which they tie their sacks; the miller's knot, which fastens their sacks after a different fashion, and many other trades also, who have each their own peculiar method of tying a knot. More than once, I myself have been asked if the knot produced were a baker's knot, or no, &c. The medical jurist is not omniscient, and he cannot be expected to be conversant with all the various implements and knacks of every trade, because his own peculiar science does not supply the knowledge necessary for this. Therefore for the same reasons that I have already given (page 136), when speaking of the matter of firearms, I would also advise in the circumstance now in consideration, a similar declaration of incompetence. The Judge must then require the attendance of the respective tradesmen concerned, examine them, and get their opinion on the matter.

§ 39. Doubtful Blood-stains on Weapons.

In criminal investigations respecting murder, homicide, wounds, violence, rape, &c., the medical jurist is often called upon to determine whether stains upon weapons, articles of furniture, doors, walls, utensils, or upon articles of dress or cloth, which appear to be blood, are really so or not. The accused denies everything, and these suspicious-looking spots, of which he says he knows nothing, may be, perhaps, the most important evidence against him. Or, he may acknowledge that the stains are blood-stains, but he brings forward reasons for their being produced by the blood of a beast. Or, he may allow that the stains upon his trousers are indeed blood-stains, but they do not arise from any wound inflicted by him, but from the fact that on a given day, previous to his arrest, he had connection with a menstruating woman. Or, in another case it may be doubtful whether the stains have been really derived from the injured person, or whether there may not be reason to suspect that he may have made them himself with the blood of an animal, to render his accusation of another party more seemingly probable. I can quote cases in support of all these different pleas, but they by

no means exhaust all the possibilities of the case, and the very difficulty of the subject, coupled with its frequent occurrence, has very naturally given rise to a continuous search after more certain methods of establishing a differential diagnosis in doubtful cases. The attainment of this end has, however, been reserved for recent times, for the numerous olden methods of investigation * have all proved to be too complicated, and too uncertain to be practically useful.

Should the objects of examination be polished metal instruments, such as the usual tools of artizans, it is difficult to confound the appearance of blood recently dried upon them, with that of stains of any other kind, particularly with spots of rust. The blood-stains are bright-red in colour, when there is only a thin layer of it adhering to the iron, &c., and of a darker-red where the layer is thicker. Such stains of blood and spots of rust are, however, most easily distinguished by heating the implement strongly, when the blood will scale off, leaving the metallic surface bright, while spots of rust remain unchanged; on the other hand, it is often impossible to distinguish by sight stains of blood which have been long dried upon iron from spots of rust. The method of investigation recommended in § 40, is a good one, and the discovery of crystals of hæmatine (§ 43)—which must always be sought for,—will confirm the diagnosis. Recent blood-stains upon light-coloured doors, furniture, or carpets, &c., are quite unmistakeable. In detecting recent blood-stains upon dark-coloured wooden implements, on the brown-coloured handles of knives or axes, brown-coloured doors, dark-coloured carpets, articles of furniture, &c., I have found it extremely useful to proceed in the manner accidentally discovered by Ollivier and Pillon, viz., to bring artificial light (as a candle) close to the suspected spot, as, by this means of illumination, reddish-brown stains may be discovered amid the darker ground-colour, which in the light of day may easily escape detection, particularly

* *Vid.* Orfila Traité de Med. Leg., 2nd Ed., II. p. 564. Lassaigne, Rev. Med., Aug. 1821. Barruel, Annales d'Hygiène Publique, 1829. Chevalier, in Poggendorf's Annalen, 1838, No. 9. Barruel and Lesueur, Archiv. de Med., 1833, I. 2 Série. H. Rose, in Casper's Vtljschft. 1853, iv. s. 295; C. Schmidt, die Diagnostik verdächtiger Flecke in Criminalfällen. Mitau and Leipzig, 1848; and B. Ritter, ueber die Ermittelung von Blut, Saamen, und Excrementenflecken in Criminalfällen. Eine gekrönte Preisschrift, 2 Aufl. Würzburg, 1854 (rich in Bibliography). Lassaigne, Annales d'Hygiène Publique, 1857, Janv. s. 119, &c. *Vid.* also under § 43.

when they are few in number, or of small size. Recent blood-stains may be further easily distinguished in general by means of the microscope, inasmuch as the corpuscle peculiar to human blood can usually be distinctly recognised, but this admirable means of diagnosis often fails us, when the blood has been long effused, when it has been wet and dried again, when it has been mixed with other substances, when the stuff upon which the stain is, *has been much rubbed or washed*, for in all these circumstances the blood corpuscles are destroyed, and can no more be recognised as such, even by the most expert microscopists.

Much attention has rightly been directed to Barruel's pretended discovery of the power of distinguishing human blood from that of animals by means of the peculiar odour evolved by the action of pure sulphuric acid. But if it be hazardous in medico-legal cases to admit proof depending on a nice distinction of colours, it is doubly so to employ in such cases the sense of smelling as a criterion, for there is no sense more liable to greater individual differences than this is, and indeed Barruel's method has been found wanting when tested by experiment; omitting many earlier and similar experiments, I may refer for proof of this, to those striking experiments instituted by Chevalier.* He prepared according to Barruel's method the blood of sheep, of oxen, and of different men, and submitted the various specimens to the noses of a number of experts associated with him; these recorded their opinion of the various specimens, the exact nature of which was unknown to them, and it was found, that though sometimes they had guessed rightly, they had much more often guessed wrong, having diagnosed human blood to be animal, or the reverse! Barruel's method, or indeed any method of distinguishing the blood of one animal from that of another by the smell is, therefore, far too uncertain, and too liable to dangerous mistakes to be ever admitted as evidence, particularly in criminal prosecutions. The following instructive case proves, however, that it is possible even after a long time to distinguish microscopically the dried blood of men from that of brutes, if it have been carefully preserved from the injurious influences already detailed. This case was brought before the Royal Scientific Commission for their opinion, and was referred by them to Prof. Johannes Müller and the author.

* Annales d'Hyg. Publ. 1853, Avril.

CASE LV.—DIAGNOSIS BETWEEN HUMAN AND BIRD'S BLOOD.

A man was forcibly expelled from his home, and thereby injured. He pretended to have fallen ill in consequence, but a suspicion arose that the blood passed by him *per anum* during the course of his illness was not human blood, but pigeon's-blood, purposely swallowed. Two physicians had certified this. On a further examination two other physicians had declared that the blood passed *per anum* between the 30th of January and the 3rd of February had been distinctly recognised by them as bird's blood when examined microscopically on the 22nd of July (after nearly six months). The Royal Medical College at X., when officially inquired at about the matter in November, would give no decided opinion, because the nature of the substance was said to be no longer recognisable; and when further asked if this must have been the case on the 22nd of July? they could give no answer. The judicial investigator, therefore, referred the matter to the decision of the Scientific Commission, and laid before it the following queries:—(1.) Is the matter sent recognisable as the blood of man or of a bird? (2.) If not recognisable, why not? (3.) Might this impossibility of distinguishing the nature of the substance have already existed on the 22nd of July, or since when has it arisen?

In the middle of February of the following year, thus more than an entire year after it was passed, the blood was examined, and the following opinion delivered:—

"In discharge of the duty imposed upon us, the suspected blood (a dry powder sent in a box), was compared under the microscope:—(1.) with recent and with dried blood from a human corpse, (2.) with recent and with dried pigeon's blood. When sufficiently small fragments of the suspected blood are prepared with a solution of common salt or of sugar, and placed under the microscope, the blood corpuscles can be distinctly recognised; these are not elliptic, but possess the form and size peculiar to the blood corpuscles of man and the mammalia; none have been found differing in size from those of human blood corpuscles, and only a few somewhat differing from the usual circular form, but neither more nor fewer of these than are usually found in the blood of man and the mammalia. No nuclei have been seen in these corpuscles, and in this they perfectly resemble the corpuscles of man and the mammalia. The blood

corpuscles in question have not the slightest resemblance to the blood corpuscles of pigeons or any other bird, and why they should ever have been identified as such cannot be conceived. The blood corpuscles of birds are, without exception, elliptical, they possess a distinct oblong nucleus, and are moreover, twice as large as the corpuscles in question. It follows then from what we have said, that the blood sent us for examination is not pigeon's blood, nor the blood of any bird, but can only be the blood of man or of one of the mammalia. Which of these it is cannot be decided, inasmuch, as the form and size of the blood corpuscles in man and in the other mammalia appear precisely similar under the microscope, and there are no certain diagnostic marks, between the two kinds of blood. Accordingly we give it as our opinion that the substance sent us for examination is not bird's blood, but the blood of man, or one of the mammalia—and it is therefore unnecessary to make any remark on the two other questions. Berlin, March 13th, 1850—Royal Scientific Commission for Medical Affairs."

It cannot be denied, that besides other favouring circumstances already mentioned, the investigation was in this case rendered much easier by having to distinguish between two forms of blood corpuscles, which are so decidedly different from one another. The following cases will, however, show how much more difficult the converse of this is, viz., to decide whether a stain has been made by human or animal blood.

Case LVI.—Is it the Blood of a Man or of a Cow?

On the 14th of January, 18—, at N., a company were drinking together in an alehouse, and among them S. and a man-servant named W., the latter saw that S. had with him a purse containing twenty-five thalers (£3 15s.), asked him which way he would go home, and immediately went off. While S. was returning homewards during the night along the snow-clad highway, he was suddenly struck, bleeding and senseless, to the ground. When he again came to himself, he found he had been robbed of his purse. W. was arrested, strongly suspected of the robbery, his boots exactly fitted the footprints in the snow; he had been formerly punished for theft, and he was spending an unusal amount of money, &c. But the most suspicious point of all was the existence of a bloody stain, the size of the palm of the hand, on the front of his drill trousers; this he ex-

plained away by saying, that during the Christmas just passed, he had assisted at the slaughtering of a cow, and this statement being found correct, the legal officials of that district sent me the trousers with a request that I would determine microscopically, whether the blood-stain arose from human or animal (cow's) blood? Several experienced microscopists, amongst them Prof. du Bois-Reymond, had the kindness to assist me in this difficult investigation. I subjoin the more important parts of the report which we transmitted to the court:—"Investigations of this nature are rendered more difficult by the blood not being perfectly recent, and also by the question lying between the bloods of such animals as have their blood corpuscles of a similar form. The latter is particularly the case in respect to the blood corpuscles of man, and those of most of the mammalia, particularly of oxen, in so far as both are uniformly circular, and the human blood corpuscles merely somewhat greater in diameter than those of the oxen. At our first microscopic examination on the 8th of February, we once more completely satisfied ourselves on these points, for recent human and oxen blood having been compared together under a glass magnifying 180 times, the difference could most distinctly be made out; also after mixing both kinds of blood together, the smaller blood corpuscles of the oxen could be readily distinguished from the larger human ones. We then proceed to examine the *corpus delicti*, a few threads from the blood-stain on the trousers were soaked in pure neat's-foot oil and examined, but instantly the utmost variety and uncertainty of opinion began to prevail among the observers present, because the form of the blood corpuscles was indistinctly seen. The blood-stain in question, moreover, at the time of examination might have been six, and was at least three weeks old, and could, therefore, only present to view perfectly shrivelled blood corpuscles, which always give an uncertain result. In order to test the contrary opinion advanced by a recent author (Schmidt) in this department, viz., that dried blood corpuscles exhibit the same volume as recent ones, and also to give our opinion the utmost possible certainty, we experimented by dropping upon other parts of the same trousers recent human and recent oxen blood, laying the pieces of cloth aside in precisely similar conditions for eight days to dry. On the 15th of February we proceeded to our second microscopic investigation by soaking both of these stains with bone-oil, and bringing them under the same microscope, first examining each stain separately, and afterwards mixing

the two bloods together. The result was, that although the dried human blood seemed to have more resemblance with that of the *corpus delicti* than the dried oxen blood had, yet the form and diameter of both kinds of blood were so much altered by the shrivelling they had undergone, that it was perfectly impossible to give a decided opinion in the matter.* We must, therefore, give it as our opinion, that it is impossible to state with certainty whether the blood-stain on the trousers of the accused is caused by the blood of a man or a cow."

CASE LVII.—IS IT THE BLOOD OF A SHEEP, A COW, OR A MAN?

Several faint traces of blood were seen on the wrist ruffles of both sleeves of the shirt of the murderer mentioned in Case CCLXXXII., which will be given further on. As the person strangled by him had bled from the nose, these spots were extremely suspicious. He, however, asserted, and his assertion was confirmed, that the day after the deed was done he had assisted at the slaughter of an ox, two wethers, and a calf, and that this was the source whence the blood came. The question was referred to us for decision. The traces of blood on the shirt, which reached us ten days after the event, closely packed in a small parcel, were very trifling, and had evidently been both rubbed and washed, so that a complete destruction of the blood corpuscles must, *à priori*, be expected. Nevertheless the best preserved blood-stain was cut out, and the linen fibres soaked in spittle, previously examined microscopically, to make sure that it was free from blood, and brought under the same microscope as in the former case. In this case also I was assisted by Prof. du Bois-Reymond, whose name is a sufficient guarantee for the correctness of the results. Alas! these were once more negative, for we could not even recognise the form of a blood corpuscle, far less distinguish whether the corpuscles belonged to human or animal blood. A counter experiment with recent human blood was of no avail in throwing light upon the object of our examination, and we were obliged to explain to the judge that it was no longer possible to make the diagnosis required.

* Brücke (Wiener med. Wochenschr., 1857, No. 23) also adduces convincing proof of the utter untrustworthiness of the micrometric measurements of blood-corpuscles that have been dried.

§ 40. Continuation.—Chemical Examination of Blood-stains.

In examining blood-stains chemically, the method usually employed is that recommended by Heinrich Rose (*op. cit.*), and consists partly of that recognised by him as the most convenient of the methods of examination hitherto employed, and partly of the method peculiar to himself. It is as follows:—the dried blood is treated with cold distilled water, which is from time to time carefully poured off from the undissolved fibrin, till the latter is left tolerably free from colouring-matter. The fibrin may be readily recognised by the microscope, especially if it be compared with fibrin obtained from recent human blood. The watery solution is then tested by reagents, but only the solution first obtained is employed for this purpose, as the after-washings contain too little colouring-matter. On the addition of such an excess of chlorine water, that the fluid after being shaken smells of it, it becomes decolourized, and white flakes are separated, which usually rise to the top. If nitric acid be added to a third part of the solution, a whitish grey precipitate occurs, and tincture of galls produces a faintly violet deposit in a fourth part of the solution. One portion of the fluid must be heated to the boiling point, whereby a larger or smaller coagulum is produced in it, according to the quantity of liquor sanguinis contained in it; if the amount of this be but small, a mere opalescence may result. The colour of the coagulum is a dirty-reddish, it is readily soluble in a hot solution of caustic potass, and the colour of this solution is more or less greenish, but it has the peculiarity, when not too diluted, of appearing greenish only by transmitted light, and red by reflected light, and this, which is seen best in a white glass, has been termed the Dichroism of the colouring-matter of the blood, to which attention has been directed by Berzelius, Lehmann, and more recently by Brücke.* When there is only a very small quantity of the solution of the liquor sanguinis at one's disposal, where, for instance, only a small blood-stain has been treated with water, all these various reactions cannot, of course, be established. H. Rose recommends in such a case that the small quantity of concentrated, or not too dilute solution, be boiled, and thereafter treated with *liquor potassæ*. After the phenomena just described have been ob-

* Brücke, *op. cit.*, recommends a still shorter method than the above, of exhibiting the dichroism of the blood.

served, this alkaline fluid may be decomposed by a concentrated solution of chlorine, upon which white flakes will become separated; or one half of the alkaline solution may be used for this purpose, and the other saturated with nitric acid, to obtain the whitish grey precipitate already mentioned. It is often extremely difficult to determine the nature of stains made by blood dried upon iron weapons, implements, &c. Vanquelin was the first to make the observation that rust formed upon iron articles within an inhabited house contains ammonia, and this observation has been confirmed by Chevalier, Austin, and Boussingault. Rose from this rightly deduces the conclusion, that the evolution of ammonia from spots of rust scratched off and heated, is no proof of the actual presence of blood in them, though that may have been suspected. If the ammonia, however, be removed by gently heating the rust in a test-tube, the application of a stronger heat must produce, if blood be present, the well-known empyreumatic smell of charring albuminous bodies, and a brown, stinking empyreumatic oil will become deposited on the upper and cool portion of the tube. But our doubts may be solved in a much more certain manner by taking the gently heated iron rust and melting it in a very small test-tube with about the same volume of potassium, or, better still, of sodium, subsequently treating the melted mass with water, and adding to the filtered solution a small quantity of a ferruginous solution, containing both the oxide and sesqui-oxide, and finally, saturating it with nitric acid. A larger or smaller quantity of Prussian blue remains undissolved if blood have been present, and the colour of this compound is green if too large a quantity of the iron solution have been used. Rose assures us—and his testimony is perfectly trustworthy—that by this novel method blood may with certainty be discovered in iron rust, though only present in a very small quantity. But he also points out, that this precipitate is not only produced by the presence of blood, but also of every nitrogenous organic substance. Iron rust, however, produced solely by atmospheric influences, is not capable of producing similar phenomena.* For the other modes of investigating blood-stains, particularly upon stuffs, *vid.* § 43.

* I must refer to the work itself for a description of Rose's important experiments upon the combination of the colouring-matter of the blood with the hydrated oxide of iron, and also for an account of the means of detecting it when the blood has soaked into a soil of garden earth rich in humus.

§ 41. Of the nature of the weapon, and the mode in which it has been employed by the Accused.

According to the statutory directions already given at p. 84, the experts must declare "whether the injuries could have been inflicted by the weapons produced, and whether any conclusion as to the mode in which the perpetrator had acted, and as to his object and bodily strength, can be drawn from the position and size of the wounds?" In general but little difficulty need be experienced in answering this question, if a little thought be exercised as to the various modes of action of the different weapons, sharp, blunt, stabbing, &c., which we have already related. The first question put is, of course, "*Could* this wound have been inflicted by this weapon?" When the wound on the body is a fractured skull, and the weapon produced an axe or large hammer, there can be no difficulty in answering affirmatively. Sometimes, however, the judge advances a step further, particularly when the circumstances of the case, the obstinate denial of the accused, &c., drive him to it, and demands, "*Has* the wound been inflicted by the weapon produced?" Of course, in very many cases, it is impossible to answer this positively in the affirmative, because a fatal injury to the head might just as well have been produced by the axe A, as with the axe B, or C, or a stab may have been given with the pocket-knife A, if it be tolerably sharp-pointed, just as well as with any other similar knife. In order, therefore, not to become compromised at an early stage of the proceedings, when other facts may still be expected to be discovered, prudence must dictate, as the answer to any such question, that the injury might have been inflicted by the weapon produced, but that *any other similar weapon* could also produce a similar injury. A negative decision is, of course, much easier, for in most of such cases the physician can easily decide that the injury *could* not have been, and, of course, *has* not been, inflicted by such a weapon; and this technical conclusion is often of the utmost practical importance, affording, as it does, incontrovertible evidence against the lying assertions of the accused on the one hand, or on the other shielding him, when unjustly denounced by others, as having injured or slain a man after such and such a fashion,—an accusation which the medical jurist may be in a position to disprove. Again, in the case of a

general fight, in which several are implicated, two or more may be accused of wounding or killing; A has been armed with the implement X, B with the weapon Z, &c., and the question is, "Who has given the fatal blow?" And, in obtaining an answer to this, the Judge must chiefly, if not exclusively, rely upon the opinion of the medical jurist, as to which of the weapons in question has inflicted the fatal injury. I shall subjoin a few of the most instructive cases, out of a large number of others, bearing upon these and similar points.

In general, it is most difficult to answer the latter part of the query: "Whether any conclusion as to the mode in which the perpetrator had acted, and as to his object and bodily strength, can be drawn from the position and size of the wound?" These questions are for ever turning up in precisely the most important capital cases of murder and homicide, for, in the most of these, the person accused lies with the utmost obstinacy. He has not surprised his victim asleep and in bed, he has not stood over, or lain over or under him, he has not stabbed him, but the deceased himself has run upon the knife, which was only presented in a threatening manner, &c. The inspection of the direction of the wounds, their depth, breadth, number, and comparison with the weapons produced, may give the most decided contradiction to all these statements, and has done so again and again in very many instances in our experience, some of the more important of which we shall by-and-by relate. A little practice and experience, with proper caution, will easily prevent any mistake in such cases, while the absence of these indispensable requirements often leads to the most extraordinary suppositions on the part of medical men, as I have often observed in the case of foreign jury trials. Caution is, however, all the more necessary, that in such cases our opinion has to be given before a jury composed of men who frequently, and not unjustly, form and put trust in their own opinion, as to the probable manner in which the deed has been perpetrated,—a matter respecting which, in truth, in not a few instances, non-medical people are fully competent to judge.

We now proceed to relate the cases illustrative of what we have been saying in this chapter.

Case LVIII.—Fatal ill-treatment, ostensibly, only a box on the ear. Rupture of the Liver.

On the 25th of October, 18—, at midday, the inhabitants of

R.'s house heard an unusual noise, the loud voice of an angry woman, then the wailing supplications of a child,—groanings and thumpings —once distinctly the words, "There —— wash thee!" then shrieks again, followed by a sound of stertorous breathing. On forcing an entrance, the housekeeper and her ten years'-old daughter (just returned from school) were found alone, the housekeeper much excited, and the child apparently lifeless, her face covered with blood and her hair dishevelled, and she did indeed die almost immediately. The murderess asserted (to the very last!!) that she had given the child *only* a couple of boxes on the ear, and these over the straw-hat (!), just as she had returned from school; upon which the child, out of ill-nature, had flung herself on the floor, and on being raised had again cast herself down, and she most obdurately denied the occurrence of any other ill-treatment whatever. Traces of blood were found on the floor and on the feet of the furniture. At the autopsy we found, besides numerous slight injuries to the skin, *forty-six* considerable ecchymoses and excoriations, on the head, trunk, and extremities, and, besides these, both eyes, the nose, the lips, and both ears were of a deep blood-red colour, and much swollen, and the *nates* covered with blue marks. *Nothing* anormal was seen upon the *abdominal coverings*. The brain was much congested, and in the middle of the left hemisphere there was an extravasation of blood to the amount of upwards of an imperial drachm, and another of upwards of two (imperial) ounces at the base of the brain. The cerebellum also, and all the sinuses were much congested. The only thing remarkable in the thorax, was the unusually bloodless condition of the heart and lungs, and the presence of some dark-red bloody mucus in the trachea. On the other hand, in the abdomen we unexpectedly discovered the effusion of nearly a whole (imperial) pound of dark fluid blood, which had come from a *laceration of the liver*, three inches long, which had divided longitudinally the whole substance of the liver between the right and left lobes. The other organs were normal. The death was of course to be ascribed to the rupture of the liver; but this laceration could not have occurred in a healthy liver such as this one was, without the application of external violence; and there were, moreover, only too many silent witnesses of violence to be found upon the external surface of the body. The fact, that no external mark betrayed the existence of this laceration, afforded only fresh proof of the correctness of our views already given (page

109) as to the frequent occurrence of such cases. The kind of violence employed could not, of course, be discovered from the autopsy, only it could with perfect certainty be declared that a mere box on the ear could not have killed the child in this manner. Also, that the cerebral hæmorrhage, which was of itself sufficient to prove fatal without any rupture of the liver, could indubitably not have arisen from internal causes under the circumstances—those of a healthy child just returned from a walk a few minutes before her death. It was also manifestly impossible that in (even repeatedly) throwing herself on the ground the child could not have produced the numerous external injuries visible on her body (in support of this I may add that the ear-rings worn by the girl on the day of her death, were afterwards found broken to pieces and scattered over the room!). The guilty woman was only condemned to twenty years' confinement in jail.

Case LIX.—A kick on the Abdomen the pretended cause of Death.

While drinking in a brandy-shop, H. and R. had a violent quarrel with each other. Afterwards they went together about a quarter of a mile out of the city, where R., who was now quite drunk, was to have entered upon service. According to a statement subsequently emitted by R., he fell down here and was kicked by H. on the abdomen; and this of course H. denied. About a quarter of an hour later, the master saw R. going about "without observing anything remarkable in his gait, or anything which might have led him to suppose him drunk." R., however, soon began to complain of violent pains in the abdomen, and spent the night in the hayloft of a neighbouring house, the proprietor of which regarded him as "very tipsy;" nevertheless, he was able at night to mount the ladder, of six to eight steps, leading to the hayloft, without assistance, and to descend the same in like manner the next morning. On account of the continuance of the violent griping pains he was sent to the Charité Hospital, where he arrived about noon next day. The sick reports of this Hospital state that he was found suffering from "a considerable contusion of the abdominal coverings, and, particularly, of the abdominal organs, as evidenced by intense pain in the belly, accompanied by tympanitis, and great restlessness of the patient. Towards evening all the symptoms were exacerbated, and,

from the subsequent occurrence of vomiting, and the feeling of fluctuation in the abdomen, it seemed to be distinctly (? ?) made out that rupture of some organ had been occasioned by the violence to which he had been subjected." Death occurred forty-eight hours after the time at which the violence was said to have been inflicted. At the autopsy the only thing visible on the abdomen of this fifty-years old man was the mark of recent leech bites. The whole of the peritoneum was, however, violently inflamed, thickened, and covered with pus, and the abdominal cavity contained about twelve ounces of purulent matter. The large omentum was also much inflamed and covered with pus. The intestines and stomach seemed only partially inflamed, and they were partly firmly adherent to the posterior part of the abdomen by means of purulent exudation. In the left pleural sac six fluid ounces of thin fluid blood were effused. The lower lobe of the left lung, and also of the right one, were inflamed, the latter was also adherent to the pleura. The other details of the autopsy we omit as unimportant. In this case, as in all similar ones, it was extremely difficult to arrive at correct views of its nature, and I hold it to be not irrelevant to give somewhat at large the substance of our opinion. After enumerating the causes which might produce a *peritonitis* so violent and rapidly fatal, and reckoning among these, of course, such acts of violence as stamping on or kicking the abdomen, our report went on as follows:—"The usual effect of kicks and similar acts of violence, is to produce, at least, ecchymosis of the part injured, contusion, and a degree of paralysis, with laceration of the internal organs lying immediately beneath, such as the Charité report assumed to exist, erroneously, however, in this case, and these results will be all the more apparent the more violent the assault has been. According to the statement of the deceased, the accused is described not only as having kicked him, but as having stamped upon him when lying, with the whole weight of his body. Generally, though exceptions do often occur, such an act of violence would be followed by more or less ecchymosis; and this was all the more to be expected in this case, inasmuch as the violence employed was so great as immediately to produce an inflammation of the organs lying beneath, of so extensive a character, and which proved so rapidly fatal. But the inspection of the body of the deceased brought to light no visible evidence of such violence, since, as we have already said, the abdomen only displayed 'the marks of several leech bites, and no other

external trace of injury.' The fact also, that the steward, B., saw the deceased, one quarter of an hour after the supposed receipt of the injury, walk about unassisted, and in a manner that did not strike him as remarkable, does, to say the least of it, presupposing the reality of so important an injury, evince a most unusual exertion on the part of R., and this is also shown by the proven fact of his having shortly thereafter ascended a ladder of from six to eight steps.

When, thus, neither the results of the autopsy, nor the other facts in evidence permit, with anything like certainty, the assumption that the fatal peritonitis has arisen from external injury, so on the other hand, reasons are not wanting for referring, with probability at least, the origin of the said disease to very different causes. Nothing at all is known of the state of health of the deceased previous to the receipt of the injury; but from this it evidently does not follow that he had not been suffering from cutting pains in the abdomen, diarrhœa, flying stitches through the body, or tenderness of the belly, on pressure,—symptoms apparently trifling and often neglected by men of his station, but which are not rarely the precursors or real commencement of such an abdominal inflammation, and which, when neglected, and still more when increased by exposure to injurious influences, may readily pass into the more acute and important disease. The latter were not, however, wanting in the case of the deceased, and the *possible* existence of precursory symptoms is far from being required to show the *probability* of the disease in question having arisen from these injurious influences. That R. had inflamed his blood and excited his nervous system by drinking brandy and beer, and quarrelling violently with the accused, is not only, *à priori*, to be supposed, but has been fully proved, the landlord having deposed that while with him the deceased was in a 'tolerably excited condition.' Whether he were now or afterwards really drunk, or only very tipsy, is not proved, the witnesses varying as to this particular. We lay no stress upon the unvarying statement of the accused, that the deceased was very drunk; yet the witness Videnz also states, that he was 'very tipsy and smelling strongly of brandy,' and, at all events, and this is all we insist upon, we may assume with certainty, that his blood and nervous system were much excited by passion and by intoxicating drinks (in which he indulged again at M.). In this condition the deceased walked a considerable distance to M. It is not impossible, or having regard to what we have

already said respecting the origin of the fatal disease from the pretended injury, it is not *improbable* that the abdominal inflammation may date its origin from this time, or that, already begun, it may now have commenced to increase. The rough usage to which he was now exposed, as the accused himself confesses, falling to the earth, and being kicked to make him rise again, &c., could only act prejudicially and injuriously. The deceased had by this time been seized with pain in the bowels, and in this condition he spent the night lying helpless in a hayloft, whilst, without doubt, an inflammation had commenced, and one of such a character, too, as to require early and active medical treatment in order to give any hope of its being conducted to a favourable termination, and whose course is so rapid that neglect for more than a whole night could not but be productive of the most detrimental influence.

While all that we have said goes to prove that a fatal peritonitis might have arisen and run its course without the deceased having been exposed to any unusual violence, our conclusions yet appear to be contradicted by the sick report from the Charité Hospital. According to it, the examination of the patient evinced 'with respect to the violence employed, a *considerable contusion* of the abdominal coverings, and *particularly* of the abdominal organs.' The subscribing medical inspectors regret that so important a piece of evidence is not given with greater distinctness. If by the word *contusion* an *ecchymosis* is intended, then an exact description of the results of the examination of the abdominal coverings would have been desirable. The inspectors, however, feel themselves at liberty to suppose that even on admission into the Hospital no trace of such an ecchymosis was externally visible, as it cannot be imagined that "a considerable" ecchymosis could entirly disappear during the twenty-four hours that the deceased remained in the Hospital, and, certainly, none such was found at the medico-legal examination of the body. They are strengthened in their supposition, that the Hospital physician did not mean ecchymosis by the word 'contusion,' because he has in his report gone on to say, '*particularly* of the abdominal organs,' and their condition in this respect evidently could not be ascertained. The rest of the report only gives the symptoms of a very acute peritonitis, and there can be no doubt as to its existence. The anormalities found in the thorax are of little importance, as, besides the complete absence of any injury there, the correct assumption, according to all medical experience, is, that the violent peritonitis

has induced an inflammation of the contiguous parts of the thorax." Accordingly, we found that, "Though it was not *impossible*, yet it was *improbable*, that the fatal inflammation had been produced by external violence," and judgment was given accordingly. Who, with a clear conscience, could have gone further, and by so doing have declared the accused the murderer of R.?

Case LX.—Whip-cuts and Kicks, the Nominal Cause of Death.

A case, precisely similar to the foregoing, occurred a few years later in the outskirts of Charlottenburg. On the 17th of May, 18—, when the temperature, at noon, was "above 20° R. (77° F.)," the railroad-labourer, Gl., well known to be a tippler, was seen very tipsy and staggering across the field, in which he finally lay down; ten minutes later, he rose again and went into a neighbouring rye-field, where he lay down again. An hour and a-half afterwards, P. and A. passing-by, found him lying face upwards, and exposed to the burning rays of the noontide sun; his countenance seemed to them "brownish black." They tried to raise him, half unconscious as he was, but he always fell back again, sometimes tottering a pace or two, but always falling at last; under these circumstances, P. gave him a few blows with the handle of his whip, and a few kicks, described by several witnesses as trifling, whilst one boy deposed to six good sound blows, and several kicks in the side. They could not, however, rouse the poor drunkard, and, at last, left him lying, covering his face to protect him somewhat from the sun. Shortly after this, a third person, Z., found him apparently senseless, at first answering nothing, only "grunting to himself," and making a few movements of his hand towards his stick, saying at last quite distinctly, "I shall come immediately." Meanwhile, Gl. was not removed, and soon after he was found dead.

Had the violence used any share in producing this man's death? The face of the corpse was, at the autopsy, of a tolerably dark-red colour, both ears and both cheeks were remarkably livid. On the right arm there were several large and small ecchymoses, from the size of a farthing to that of a pea, on the left arm some smaller similar patches, also numerous livid stains on the left shoulder-blade. For shortness' sake, I may at once state, that both at and after the opening of the cranial cavity, an intense apoplectic con-

gestion of the brain (without effusion) was found to have been the cause of death. The spinal marrow was normal. Both lungs were strongly congested with dark treacly blood. The liver was steel-grey, as it generally is in drunkards. The rest of the dissection is omitted as unimportant. The report goes on to say how the results of the autopsy explain the last words of the deceased, "the blackish-brown countenance," the loss of consciousness, and the "internal grunting," as symptoms of a fatal apoplectic seizure, produced by the conjunct influence of the intoxication, the high temperature of the air, and the direct action of the sun's rays upon the head. "It is extremely probable that the fatal attack had already commenced when the accused first meddled with the deceased, as he was already senseless. The violence used was, however quite trifling, as has been proved by the eye-witnesses, and, moreover, blows from a whip-handle on the back, shoulders, and buttocks, as well as gentle kicks in the side could have no influence whatever on the ultimate result, and the appearances on the dissection confirm this, inasmuch, as only very trifling ecchymoses were found to have resulted from these blows." It was accordingly decided that the violence used had *no share* in producing the death.

Case LXI.—Death from Violence, nominally only a few slaps of the hand.

We have already (Case LVIII.) given an instance of the daring lies with which the accused come before the Judge, and the obstinacy with which they adhere to them, and no more striking instance of this could be given than the following case, in which it again became the duty of the medical jurist alone to open the eyes of the Judge, and to throw the light of scientific truth upon concealed and lying villany:—On the 24th of September, 18—, the dead body of a child, with external traces of violence upon it, was found in a basket in a thicket near a village, and speedily recognised as the child of a journeyman-weaver, named Pöhlmann. According to the statements of all the witnesses, this man's wife had not only never loved this, her lawful child (one year and three-quarters old at its death), but had often starved it, so that it had been seen to eat raw potato-parings greedily, and had very often beat and tortured it in a most revolting manner. Many eye-witnesses deposed that the *parents, Pöhlmann, had caught hundreds of wasps in the*

same room with which they now and then shut up the child. The following, is word for word, the evidence of the son of an acquaintance, aged 15, before whom a beating was inflicted on the evening of the 23rd September, *i. e.*, shortly before the death of the child: "At eight o'clock in the evening, the woman P. came to our house to fetch her child; when she saw it had dirtied itself, she seized it by the arm and commanded it to stand up. When the child would not do this, she first hurled it from her about four feet towards the secretaire, and then kicked it so that it rolled into the middle of the room. She then seized its head with both her hands, and knocked its forehead at least five times on the floor; finally, she struck it several severe blows with her fist in the neck, back, and buttocks. The child was quite feeble and did not cry, but only groaned. She then took the child by the hand and went out saying, If you won't walk, I'll kill you outright." The accused, on the contrary, declared, that she had only given the child "a few slaps on its bottom," and had then gone home with it, carrying it part of the way, as it was tired. Arrived at home the child refused to eat, wherefore she gave it another slap, this time, from oversight, not on the bottom, but on "the left side." "I gave the child," she said, "but one slap, yet it immediately began to whimper and groan, so that I lifted it from the floor and carried it about for some time. It was very cold, so I soon placed it in bed, where it got quieter and quieter, and finally died in about an hour and a-half." She swathed the body, and placed it under the bed, in which she *slept quietly* (!!) the whole night, after telling her husband on his return home, that she had left the child with the acquaintance already mentioned. Next morning she placed the body in a basket, covered it with an apron, and took it and a potato-grubber with her, to make the people think she was going to dig potatoes, and deposited it in the place where it was found. On her return homewards, she hid the grubber in a strange house, where it was afterwards found. At the medico-legal examination we found more than *two-and-sixty* larger or smaller ecchymoses on the head, numerous blue patches on the extremities, the right side of the body and the abdomen; internally, we found a star-shaped fracture of the occipital bone extending to the *foramen magnum*, so that the two halves of the bone could be moved backwards and forwards, a fissure of the right parietal bone, considerable hyperæmia of the brain, and an extravasation of upwards of twelve drachms (imperial) of blood at the base of the brain. The medico-

legal report had, according to the then judicial practice, in the next place, to determine in what degree the wounds were dangerous to life. But it is of no consequence to recapitulate this here, or to explain why we declared them to be necessarily and always fatal. Then several questions were put respecting the nature of the injuries, and how they had been produced, in relation to the statements of the witnesses, and that of the woman Pöhlmann, and the potato-grubber found under such suspicious circumstances; and in respect to these queries the report goes on to say:—

Although the accused continues to persist in her statement, that she gave the child only one slap on the side, yet this is wholly undeserving of credit, for it must be apparent even to non-medical persons, that such a blow could not fracture the bones of the skull, but rather that this fracture of necessity implies that some blunt weapon has been brought forcibly into contact with the head of the child. Any blunt body might produce such an injury, *e. g.*, either a thick stick, a wooden shoe, the back of an axe, &c., and, of course, also the potato-grubber which has been taken possession of by the authorities. The injuries to the skull might also be occasioned by repeatedly knocking or hurling the head against the deal floor of a room, against articles of furniture, &c.; and we come thus to the second question put before us, which deserves to be carefully considered. According to the above-mentioned statement of the boy Sellheim, the prisoner hurled her child about four feet along the floor "towards the secretaire," about two hours before its death, "rolled and shoved it about with her foot, knocked its forehead and side at least five times against the floor, and gave it several violent blows with her fist on the neck, back and buttocks."

Although it cannot be denied, that such rough and violent usage of so young a child might have killed it, by fracturing or fissuring the thinner bones of the skull, as the parietal bone, or squamous portion of the temporal bone, or by producing concussion of the brain or extravasation of blood, yet, for the reasons already mentioned, we cannot suppose it capable of producing such a fracture of the occipital bone as we find here. Another important reason also tends to support the view that the fatal injury was another and a later one, than any of those witnessed by Sellheim; viz., the prisoner has confessed that she *partly* carried the child home, and there set it on the floor to go and cook potatoes in the kitchen. At first, the child being "very discontented," would take none of the potatoes, took

them, however, afterwards, but flung them away immediately, laying itself down on its side after its usual fashion. And only after its fresh chastisement is it for the first time stated to have groaned, become cold, and shortly thereafter died. According to the prisoner's own statement, therefore, the child had walked home, and after all the ill-usage it had received in the Sellheim's house, had possessed strength enough to sit up in the room, and sense enough to take a potato when told to do so, and afterwards to fling it away. Such a condition of body and mind is incompatible with the supposition that the various injuries found at the autopsy had already been inflicted, for after that the child could not have partly walked, partly been carried home, but must have speedily become senseless and unable to remain upright." Accordingly, therefore, we stated in our report that the cranial injuries must be regarded as necessarily fatal, that they *might* have been produced by the potato-grubber, and that it was not probable that they were the result of the ill-usage the child had received in the Sellheim's house. These views I delivered verbally at the final hearing of the case, the prisoner still steadily maintaining her plea of not guilty. At this time she was sentenced to death, and to be drawn on a sledge to the place of execution. She appealed, however, and made the absurd statement that she had hitherto concealed an occurrence that might have been the cause of the child's death; that night, after she had brought the child home, she put the potatoes before it on a table, and set the child upon a footstool that it might reach them; while she was in the adjoining kitchen the child fell from the footstool and died in an hour and a-half! It was of no avail for the Judge to represent, that it was most improbable that she should have purposely, and most injuriously for herself, concealed till this time a fact of such importance, and one which she must have known would at once have freed her from all blame in respect to her child's death. I had also to maintain my original views at the hearing of the appeal, and to reject this new statement as inconsistent with the results of the autopsy. From purely judicial considerations, however, the sentence of death was commuted to twenty years' imprisonment in jail.

CASE LXII.—FATAL WOUND OF THE HEAD: WAS IT CAUSED BY A STICK, BY THE TOP OF A TABLE, OR BY BEING DASHED AGAINST THE FLOOR?

The following case, like those succeeding it, belongs to the category of those already referred to, as important and extremely difficult to decide, where a man in a quarrel or disturbance gets set upon by several at once, armed with the most various weapons, and dies from the injuries received. It becomes, then, a most important question to decide which of all his assailants is to be looked upon as the real author of his death? In such a case the evidence of eye-witnesses is seldom of any value, as all present are generally more or less implicated, more or less drunk, every one lies, and the medical jurist alone can clear up the case and prepare it for the Judge's decision. And he, on his part, must act with the utmost prudence, lest he cause the condemnation of an innocent person.

The host of a small tap-house had fallen out with his guests, already excited with beer, spirits, and politics (in the spring of 1848!), and a general row set in, in a small room crowded with a billiard-table, furniture, and many men, in the course of which mine host was thrown down and beaten with sticks, billiard-cues, &c. All I know of his subsequent illness is, that he died after four days, and that he was sensible only on the first two of these. The most important results of the autopsy in relation to the queries afterwards propounded, were the following:—

S. was thirty-nine years old, and tolerably strongly-built; both eyes, but particularly the left, were intensely ecchymosed, immediately over the left orbital arch there was a crescentic, tolerably sharp-edged wound, one inch and a-quarter long and half a line broad, already begun to heal; under the left lachrymal bone there was a round sharp-edged wound of the skin the size of a pea. The whole of the left upper extremity was covered with ecchymoses. Internally, there was considerable congestion of the *pia mater;* the entire surface of the brain, particularly that of the right hemisphere, was covered with yellowish-green pus, a similar purulent layer was spread over the under surface of the cerebellum. On the left orbital portion of the frontal bone, there was a clot of blood weighing about two drachms (imp.), and immediately beneath it a fissure in the bone half-an-inch in length, through which a probe could reach the eyeball. The ex-

amination of the other cavities is omitted as unimportant. Besides the then customary question as to the absolute and necessary fatality of the wounds, we were likewise called upon to answer the following :—

(1.) Whether any of the injuries found on the deceased, particularly whether the fracture of the *pars orbitalis* of the frontal bone has been caused by blows with a stick, or by a table-top, or whether it may not have been caused by the head being dashed against the floor or wall of the room?

(2.) Which of the injuries, considered in the provisional report under the Nos. 12, 16, and 18,* has been the *efficient cause of death*, or whether each by itself might have been so, or whether they only became so by their simultaneous coincidence? In answer to the latter of these queries, after explaining that the circumstances of the illness and medical treatment of S. were wholly unknown to us, we stated, that we could not ascribe an absolute and necessarily fatal character to the traumatic meningitis which must have existed, but that this necessarily fatal character must be attributed to the fracture of the frontal bone, because its orbital portion forms part of the base of the skull, all fissures and fractures of which are inevitably fatal; because on the one hand, the existence of such an injury presupposes the application of such an amount of violence to the cranium and its contents, as must be attended with concussion of the brain, effusion of blood, or inflammation; and, on the other hand, the powers of nature, or of the medical art, are insufficient to neutralize the consequences of such excessive violence.

In answer to the former query, our report states, "The medical inspectors feel themselves necessitated to reply in detail to each separate head of the question put to them in respect to the weapon with which the injuries to the head might have been produced. The ecchymoses on both eyes and on the left arm, are the only injuries which can be supposed to have been produced by the blows of a stick, although all of these injuries might equally well have been caused by other kinds of violence, as blows from the fist, knocks, &c. The small round opening at the left side of the nose, on the other hand, is to be referred, with the utmost probability, rather to a push with a stick, particularly with the pointed ferrule of one, than to any of the other weapons enumerated. Certainty on these points is, however, unattainable, and does not seem requisite, since to none of these injuries

* *i.e.*, suppuration of the cerebrum and of the cerebellum, and the fracture of the frontal bone.

do we impute any share in the production of the death of the deceased. The wound over the left orbital arch exhibits "tolerably sharp" edges, and must, therefore, have been produced by a tolerably sharp body, and the angle of a table-top or the corner of a wall may be regarded as such (certainly more so than a stick). This wound might also have been produced by "dashing the head against the floor," provided there were a projecting angle of a deal board at the part of the floor on which the head was dashed, or it might be produced by dashing the head against the corner of a wall, a sharp-angled table-top, or foot of a billiard table or bench. The actually and absolutely fatal injury is indubitably inseparably connected with the wound over the left eye, and the statements as to the nature of the weapon that may have produced this, apply equally well to the production of the internal injury. Moreover, it would require very considerable external violence to produce such a fracture of the skull, and in this respect it is not likely to have been produced merely by a blow of a stick, while blows from, or knocks against the top of a table, or against the wall or the floor, especially if given with considerable force, most certainly could produce such a fracture. In accordance with the foregoing, we gave it as our opinion:—(1.) that the fissure of the orbital plate of the frontal bone *might* have been caused by a blow from a stick, but that more probably it had been occasioned by a table-top, or by dashing the head against the floor or a corner of the wall; (2.) that the fissure mentioned had been the actual cause of death, and finally (3.), that this injury was of such a character that it "necessarily, and under all circumstances, must have caused the death of a person of the same age as the deceased."

CASE LXIII.—FATAL PENETRATING WOUND OF THE FACE AND HEAD: WHETHER HAS IT BEEN PRODUCED BY AN INFANTRY OR CAVALRY SABRE?

We could not, in this most peculiar case, give so decided an opinion as the Judge desired. During a riot, a man, aged 40, was cut over the head by soldiers with their sabres, and five days thereafter died. On the left side of the face, stretching downwards from the eyebrow for four inches, there existed a sword-cut, brought together by stitches, which had already commenced to heal. This cut had not only divided both eyelids, but had also laid open the *antrum Highmori*.

There was also a second sword-cut over the right parietal bone, three inches long, which had cleanly and smoothly divided the bone and the cerebral meninges; there were also several zigzag fissures of the inner table of the skull, one piece of which, the size of a half-penny, was quite loose. The veins of the *pia mater* were empty, but the entire surface, both upper and under, of the cerebrum and the cerebellum was covered with a layer of pus, two lines in thickness.

"It is desirable," said the requisition from the court-martial, requiring a reasoned report of the medico-legal examination, "that the report should state, whether both of G.'s wounds could have been produced by one weapon, as, according to the testimony of eye-witnesses, several persons, both *infantry and cavalry*, are implicated in the wounding of G." After stating in our report, as was then required, the absolutely fatal character, not of the face-wound, but of the sabre-cut on the head, we went on to say, in respect to the character of the lethal weapon as follows:—"When the court requires the subscribing medical inspectors to state, whether both of the injuries mentioned have been produced by the same weapon or not, they must reply, that they cannot answer this question. The condition of both wounds, the sharpness and smoothness of their edges, and their length and depth, all testify with certainty to their being the results of blows from some sharp cutting instrument, but whether one or other of the wounds has been caused by an infantry or cavalry sabre cannot be determined. And in giving this opinion, the medical inspectors feel themselves called upon to state that, quite recently, a very similar case of penetrating wound of the head had come before them, in which they were able to state distinctly, that the wound had been produced by the sabre of an infantry private." The requisition sent us contained also the following statement:—"Several witnesses have stated that L., one of the horse-guards, gave G. several blows on the front of his chest and abdomen, after he lay stretched on the pavement bleeding from the wound on his head, such blows must have left at least ecchymotic marks, but the protocol of the inspection says nothing about any such marks of injury upon the body." To this we thus replied in our report:—"We have now to remark upon that evidence, according to which the deceased was cut upon the breast or belly by a soldier, after he was stretched on the ground. If the court means, that from such cuts ecchymotic marks must at least have arisen, the medical inspectors cannot confirm this supposition, as experience teaches that much more important injuries

than these hypothetical blows—which must have been given with the flat of the sabre, as its sharp edge would at least have divided the skin—may be inflicted without leaving any trace visible on the dead body. Therefore, because such traces were not observed upon the body, the protocol of the inspection truly and expressly stating under No. 11, that besides the correctly described wounds on the head, "no other injuries," consequently, no ecchymoses, &c., were visible on the breast or belly, the medical inspectors cannot, from their point of view, either support or contradict the evidence above quoted." Our opinion must, therefore, be as follows:—"(1.) The deceased has been killed by the cranial (and not by the face) wound above described; (2.) that all the other injuries found on the body and mentioned in the protocol (unimportant bruises, scratches, &c.), had no share in producing the death; (3.) that the results of the medico-legal examination afford no data for deciding whether different weapons have produced the different wounds, nor (4.) whether after the deceased had received the wound on his head, and had fallen to the ground, he was again assailed by blows upon his thorax and abdomen.

Case LXIV.—Fatal Wound of the Brain: Has it been produced by a sabre or hatchet?

One summer night, a scuffle arose in a dancing-room, which resulted in the forcible expulsion of a bricklayer named D.; but the fight being renewed in the street, and the blows flying thicker, a party of police hurried to the spot; and one of them was said to have cut down D. with a blow on the head from his sharp sabre. So much at least was certain, viz., that D. exclaiming "My head!" fell down, bleeding copiously, and was carried to the Charité Hospital, where he died in about sixty hours. Three days after his death, a judicial examination of the body took place, at which there was found externally, exactly in the centre of the forehead, a wound one inch and a-half long, united by surgical sutures. This wound had a vertical direction; its edges were sharp, smooth, and with no trace of ecchymosis, and between them the injury to the bone could also be easily perceived. On the right shoulder-joint there was also a wound that had been stitched, one inch and three-quarters long, running horizontally from before backwards, with sharp edges ecchymosed to the extent of one line's breadth. The wound in the bone com-

menced at the coronal suture, and for the length of about one inch and a-half it gaped to the extent of one-third of an inch, coursing onwards subsequently, as a fissure of a line's breadth, to the right orbit. From the coronal suture another similar fracture, at right angles to the first, extended through the right parietal bone; the edges of the fracture were sharp and not stained externally with extravasated blood; internally, however, for half-an-inch in breadth they were infiltrated with blood, and the internal table was extensively split, five pieces of it lying loose upon the *dura mater*. The cranial bones were of the usual thickness. All the cerebral meninges were cleanly divided opposite the external wound, and the brain itself protruded, brown and bloody, from between their edges. A more minute examination discovered a wound of the brain itself (its cortical substance only) one inch and a-half long. Both the upper and under surfaces of the brain were covered with a layer of sanguinolo-purulent ichor. The fissure of the frontal bone extended one inch internally along its orbital plate. In such a case it was of course easy to determine the facts connected with the death. As to the weapons employed in producing such a wound, the legal documents mentioned both the side-arms of the police and also an axe. We stated, that a sharp axe could indeed cleanly and sharply divide the cranial bones, but that, generally, many more co-existing fissures and even fractures would be found than in this case, whilst universal experience proved that a cut with a sharp sabre could divide the skull cleanly and sharply into the very brain, and often did so; wherefore, we affirmed, that "it was much more probable that this wound had been occasioned by a sabre than by an axe."

Case LXV.—Fatal Wound of the Thorax from a blow with a scythe.

This case presented no judicial difficulties, at least according to the present state of our criminal code, but was rare and interesting from the peculiar nature of the lethal weapon. A quarrel had arisen between some relatives—field-labourers—who were drunk, and it ended by A. seizing a scythe lying on the ground, and giving B. a cut on the right side with it. What happened immediately after the receipt of this frightful injury, or how long the wounded person survived it is to us quite unknown. A very considerable bed-sore,

however, found upon the body betokened an illness of considerable duration. A wound eight inches long, with clean cut edges, began at the lowest false ribs on the right side, and extended upwards towards the vertebral spinous processes; its edges had been brought together by sutures and were partly adherent and united between the eleventh and twelfth ribs to the extent of about three inches only; it had cut through the intercostal muscles, and apparently opened the thorax; and this was found to be the case on inspecting the interior of that cavity subsequently. The lung was uninjured, but death had been the result of traumatic pneumonia. The right lung was for one line in depth covered with a layer of thick pus, and in its middle lobe there was a purulent cavity (abscess) nearly the size of a child's head; all the rest of its tissue was in a state of grey hepatization. The left lung exhibited red hepatization, but no suppuration. The little blood left in the (right) heart, and in the *vena cava* was dirty-red, decomposed, half fluid, half grumous. The rest of the dissection was rendered all the less important by the advanced state of decomposition (from the heat of summer) which the body had already attained. The connection of the fatal pneumonia with the penetrating wound of the thorax, and the consequent lethality of this wound, was of course easily demonstrated. At the trial I had, in answer to a query, to make the simple deduction that the existence of the wound on the right side proved that the perpetrator had stood behind the deceased when he struck him. (The culprit, on account of the mitigating circumstance of having been drunk at the time of the perpetration of the deed, was only sentenced to two years' imprisonment.)

Case LXVI.—Fatal Cerebral Hæmorrhage: Has it been caused by a fall, or by kicks and other acts of violence?

This most interesting case could not be with any certainty decided by the results of the autopsy. One January, two very drunken men—K. and a coachman M.—fell a-quarrelling; very shortly after M., according to the statement of the accused, K., had fallen upon the kerbstone and hurt his head severely, in fact, his head was seen to be bleeding. Immediately after this, the quarrel arose in which K. belaboured M. on the head with his fists, as two witnesses declared on oath, and also pitched him down-stairs so violently that the noise of his fall was distinctly heard; and on his again coming up, flung him

down again, kicked him with the heel of his boot upon the head and loins, and finally, struck him with a boot-tree in the loins or side! The subject of this ill-treatment very soon fell apparently fast asleep, was carried to the Charité Hospital, and died there on the tenth day after the receipt of the injuries. The body had an icteric hue. On the left parietal bone there was a healing wound, half-an-inch long and with dry sharp edges; beneath each eye there was a crescentic ecchymosed spot three-quarters of an inch long; no other external mark of injury. The cranial bones were uninjured, but on removing them three or four ounces of dark fluid blood flowed out. The *dura mater* over the whole left side of the head was of a bluish-red colour, thereby evincing that there was an extravasation beneath it, which, in fact, as a dark clot of about two ounces (imp.) in weight covered the whole of the left cerebral hemisphere. In the substance of the *pons Varolii* there was a second extravasation the size of a bean, and a third one was spread as a clot, one line thick, over the whole of the base of the brain. The cerebellum and the veins of the *pia mater* were much congested. The other results of the investigation were unimportant. It was evidently easy from the results of such an autopsy to establish incontrovertibly the fact of the homicide, "but," as we stated in our report, "it is not so easy to determine incontrovertibly the weapon with which the injuries have been inflicted. The blows from the fist testified to by the witnesses explain the ecchymosed eyes in the most simple manner. The small external wounds, and the internal cranial injuries could not be referred simply to blows from the fists; the first, because such blows do not divide the skin with "clean-cut edges," the second, because such blows are not competent of themselves to produce rupture of intra-cranial vessels. One or more kicks, such as a very drunken person might give with a strong boot-heel to one lying beneath him, might have produced both of these injuries, particularly if the heel were shod with iron or nails. But these injuries might have been equally readily produced by a drunken man, such as M. unquestionably was at the time, being repeatedly thrown down, such a man always falling heavily upon his head, and these injuries might still more easily have arisen if he had been actually thrown down a stair, and had in falling struck his head upon it; but in respect to the truth of this latter supposition, no certainty can be attained." The circumstances of the case did not permit of any more decisive opinion being given.

Case LXVII.—Fatal Wound of the Liver—by a sabre or bayonet?

This case was not doubtful. In a conflict between the armed corps of working engineers and the city militia in front of the then "National Assembly" Hall on the night of the 31st October, 1848, one of the former corps had been wounded by one of the latter, and died in a short time. In the hepatic region we found a wound three inches long by two wide, with clean-cut ecchymosed edges, out of which a loop of the *ileum* protruded. Coagula of blood to the amount of one pound covered the omentum and mesentery, and eight ounces of fluid blood were effused into the cavity of the abdomen. At the edge of the right lobe of the liver there was a sharp-edged wound two inches deep. A doubt arose as to which side had given the wound. On the one hand it was alleged that the deceased had met his death by a chance bayonet wound from his own comrades, whilst the latter asserted, that the leader of the city militia had cut him down with his sabre. The state of the wound was so decidedly in favour of its having been inflicted by a sabre, and against its having been a bayonet-thrust, that there could be no hesitation as to the opinion to be given.

Case LXVIII.—Fatal Injury to the Abdomen, apparently from a bayonet-thrust.

Here also the question was about a bayonet-thrust. But in this case, we had to decide according to the statutory definition, whether the weapon produced *could* have occasioned the injury? and this we were obliged to deny, though appearances were much in favour of it. The case was a rare one, and quite peculiar. In a cold winter night, a drunken vagabond was arrested by two grenadiers. On the way he escaped from them and ran off, but soon fell upon the slippery street with such violence, that his fall was heard some distance off; he quickly picked himself up, however, and was just about to make off again, when one of the soldiers flung his musket at him bayonet first; this struck the runaway and stopped his career. He was caught, but speedily became unable to stand upright, or walk a step farther, so that he had to be carried to the station-house, which was not far off, and there he expired immediately after his admission. The

most important results of the autopsy were the following: between the eleventh and twelfth ribs on the left side, five inches from the vertebral column there was a triangular wound, each side of which was three-quarters of an inch long; it had clean-cut, feebly ecchymosed edges, and was filled with dried blood. The abdominal coverings were uncommonly fat. The posterior wall of the peritoneum was entirely, and its duplicatures partly, infiltrated with dark half-coagulated blood, whose source could not be discovered. In the abdominal cavity there were fully three ounces of bloody serum. The bayonet-wound externally had not, however, penetrated the abdomen, but had *terminated* in the fat of the abominal coverings, in which for about half-an-inch around the wound there was an infiltration of black blood, partly fluid, partly coagulated. Nothing else was found in any way remarkable, or bearing upon the cause of death, if we except a considerable congestion of the cerebral veins, and the vessels of the *plexus choroidalis* (and the pathologically interesting discovery of a complete adhesion of the heart with the pericardium, so that at no part could they be separated). The deceased had consequently died from hæmorrhage into the abdomen; but this had not been caused by the bayonet-stab, since it had not penetrated the abdomen, nor touched any vascular internal organ, nor any blood-vessel. On the contrary, the cause of the hæmorrhage must rather be sought for in the fall which L. had sustained on the street pavement, just shortly before the receipt of the wound. That the drunken man had had a most violent fall was sufficiently proved by the evidence, and the concussion of this violent fall must be regarded as the cause of the rupture of a blood-vessel, from which the hæmorrhage, we added, must have taken place slowly, as it had time to infiltrate so large an amount of muscular and cellular tissue, whilst in a case of rapid internal hæmorrhage, the results of the autopsy would have been quite different, and therefore the deceased might very probably have been able, immediately after the fall which had ruptured the vessel, to spring up and run a few steps further, till the blow and the impediment to his motions from the gun hanging in his clothes brought him to a stand still; now, however, the continuance of the internal hæmorrhage caused him to fall down, and its fatal effects became visible. "However probable, therefore, it may appear upon a superficial view of the matter, and precisely because the man very soon after receiving the wound fell down and died, that there is a causal connection of the injury with the death, yet this

has been by no means the case, but a man already death-struck from another cause, has received an inconsiderable wound, one which under other circumstances might have been, as similar wounds very often are, productive of no injury to life."

CASE LXIX.—FATAL WOUND OF THE INTER-OSSEOUS ARTERY.: HAS IT BEEN PRODUCED BY A PIECE OF ZINC PLATE, OR BY A KNIFE? EXAMINATION OF THE KNIFE FOR BLOOD-STAINS.

In this case, which was alike interesting in a surgical and in a forensic point of view, it was important, for the judicial investigation of the intention of the accused, to ascertain with what weapon the injury had been inflicted. We did not hesitate to deliver a negative but certain opinion, not being able to give as certain a positive one. The difficulties offered by the case, from the need there then was of correctly answering the judicial questions regarding the lethal character of the wound, &c., would not exist to complicate the case in the present state of the criminal code. On the evening of the 20th of December, two bedfellows had a scuffle together, and one of them, a strong healthy man, aged 33, was so severely wounded that the blood instantly streamed from his left arm. After the lapse of an hour a physician came, who sent him to the Charité Hospital, where he arrived in a very feeble condition, and complaining of cold and anxiety; after applying a tourniquet, the following particulars were remarked: On the upper part of the arm there was a longitudinal wound three-quarters of an inch long, four lines broad, and a quarter of an inch deep, from which only venous blood came. (2.) Beneath this a superficial skin-wound. (3.) In the flexure of the elbow-joint at the point of insertion of the *biceps* muscle, there was a triangular wound with its edges turned inwards, and which penetrated to the depth of about one inch; on slackening the tourniquet, arterial blood flowed from this wound. (4.) On the external side of the upper part of the arm a trifling skin-wound. (5.) In the cardiac region two slight scratches, probably caused by the slipping of the instrument from the arm. Retaining the tourniquet, the edges of the wound were brought together (by a bandage) and a bladder of ice laid over it. On the 23rd, the patient complained of violent pain in the arm. The whole of the bandage, &c., was removed, arterial hæmorrhage immediately recurred, and,—the clinical report states—"as the artery could not be successfully tied, from the depth of the wound, the only

means left of saving the patient was to tie the brachial artery," which was successfully and "comparatively rapidly" carried out at the middle of the arm, at the internal edge of the *biceps*. The patient received phosphoric acid internally, and a bladder of ice was laid over the operation wound. During the two next days there was no unpleasant symptoms. On the 26th, when the bandage was taken off, arterial hæmorrhage to a small amount again recurred from the lower wound, but it was easily arrested by compresssion. "The wounds themselves were ill-coloured, their secretion thin and ichorous, the patient felt feeble and depressed, his intellect was somewhat confused, and his pulse very frequent, the edges of the operation wound had assumed a bluish colour, and this rapidly spread, till the neighbouring skin to about the size of the palm of the hand was gangrenous." The wound was now dressed with pyroligneous acid, lotions of aromatic herbs and vinegar were employed, and aromatic fomentations laid over the arm. "The patient's condition remained very precarious, his strength had rapidly diminished, his countenance was collapsed, his pulse very frequent, 110 in the morning, and 128 in the evening." In the beginning of January his condition improved till the 10th, when he began to complain of abdominal pain (opiate friction, poultices, and Dover's powder were prescribed). During the night a violent diarrhœa set in, which rapidly increased in spite of the use of opium (1 scruple to 6 oz. of decoction of althæa). The fever increased, the patient's strength decreased, and a bed-sore began to form. "On the 11th of January, a short dry cough set in, which did not, however, trouble the patient much." The feet became œdematous, the cough and diarrhœa persisted. On the 14th, the patient became unconscious, and on the 15th of January he died (just twenty-six days after the receipt of the wound).

The following were the more important results of the autopsy:— The body was much wasted, its inferior extremities œdematous, there was a bed-sore upon it, and the entire inner side of the left arm was bared of its skin, so that muscles and tendons were distinctly seen bathed in unhealthy pus. All the earlier wounds were healed with smooth edges, except that at the bend of the left elbow there still remained a wound one-third of an inch wide with obtuse edges, which had been originally clean-cut. (The condition of the edges was important, as we shall by-and-by see.) Within the cranium, the absence of blood was the only thing remarkable. The left lung was œdematous, the right in a state of grey hepatization, and its pleura was

covered with purulent exudation; in the left pleural cavity there was a cupful of bloody serum; in the right one, about as much sanguinolo-purulent fluid. The flabby heart, as well as all the great venous trunks of the thorax, and of the abdomen, and all the abdominal organs exhibited a remarkable bloodlessness, and this was the only thing anormal in the contents of the abdominal cavity. The blood-vessel wounded was found to be the inter-osseous artery, as had been correctly supposed in the Charité, while the patient was yet alive. The perpetrator of the deed had asserted, that he had only "stuck" K. with a piece of zinc plate; but the condition of the cicatrices, and the whole history of the case, did not permit the truth of this to be assumed, and we held to our opinion delivered at the beginning of the case, that some sharp-pointed cutting instrument must have been employed. Later in the course of the investigation, a table-knife was found beneath the bed of the accused, covered with suspicious-looking spots; and this instrument was laid before us with the query:—"Whether the rust spots on the knife had been produced by blood?" We undertook the investigation of this matter, in conjunction with the skilful judicial expert Apothecary Schacht, and in respect to it I may mention, that Rose's new mode of procedure in such cases (*Vid.* p. 145) was not then known.

The appearance of the knife indubitably betokened that, if the stains upon it had been produced by blood, a considerable time must have already elapsed (two months and a-half had passed), since (1.) the whole surface of the blade of the knife was rusted, and (2.) in the cleft between the blade and the horn-handle a brown mass, partly covered with mould, was sticking. With a hair-pencil, a few drops of water were placed upon the blade of the knife, and so washed over it as to dissolve as much as possible of any soluble stain; then one drop of the fluid was put under the microscope, and the rest of it evaporated upon the knife-blade with the aid of a gentle heat, with the following results:—(1.) Under the microscope, red globules could be seen swimming about resembling the blood globules. (2.) After the fluid had been evaporated on the blade of the knife, it was examined with a magnifying-glass, by which it was quite evident, that a red layer had been deposited upon the rusty surface, this deposit being due to the red solution formed upon the rusty blade, and deposited on the evaporation of the water. The following counterproof was instituted.—A few drops of blood were put upon a bright knife-blade, allowed to dry, and the stains gently heated, the

blood then scaled off, leaving the metallic surface quite bright and clean; a greater degree of heat caused the blood to carbonise, and produced the peculiar smell of burning animal-matter. But the stains upon the suspected knife did not scale off on being heated, but on the application of a greater heat became carbonised, with exactly similar attendant phenomena. From this it was seen to be probable, that there was no recent blood upon the blade, but that an animal substance was mingled with the rust, which might be putrefied blood. The knife was now placed in a narrow cylinder of glass filled with distilled water. No sanguineous coloration of the water took place, but after twenty-four hours, a reddish-brown powder had been deposited, and this was separated by filtration. The filtered fluid gave no trace of iron nor of animal albumen. The reddish-brown powder was recognised as rust of iron by being dissolved in muriatic acid and the solution tested by ammonia, ferrocyanide of potassium and tincture of galls. The appearance of the knife was not materially altered by its being put into the water, and the stains were not visibly diminished. After the knife was dry, a little pure muriatic acid was poured upon one side of it, the stains immediately disappeared, and the bright surface of the metal became at once visible, the solution formed was one of oxide of iron in muriatic acid. In accordance with these experiments we decided, that the knife had probably been stained with blood, but that certainty on this point was unattainable after the lapse of so long a time. All our views on this case were adopted in both the judicial courts, and the accused was sentenced to eighteen months' imprisonment with hard labour.

Having given the foregoing cases in illustration of the judicial query:—Whether certain weapons could have produced certain injuries? we shall now proceed to lay before the reader the few following cases,—selected important capital cases of murder and homicide,—in illustration of the much more important judicial query respecting the mode in which the perpetrator had acted, the position in which he, or the murdered person, must have been at the time the injury was committed, &c. It will then become apparent how important in such cases, how momentous for the accused, how instructive for the Judge, the opinion of the medical jurist may be, and how much, therefore, he must strive to give the most careful consideration to every circumstance that may become explanatory, however trifling it may appear.

CASE LXX.—FATAL SMASHING OF THE SKULL WITH REPEATED BLOWS OF A HAMMER. IN WHAT MANNER HAS THE MURDER BEEN COMMITTED?

On the 23rd of March, 18—, the tinsmith Bontoux, who kept an open shop for tin goods, was found lying murdered on the floor of the kitchen of his own house which adjoined his shop, and was on the groundfloor. Like all such scenes, it was a horrible sight. The murdered man had apparently heard as it were the sound of thieves breaking into his dwelling during the (bright moonlight) night, and sprung hastily out of bed, for the chair in front of it lay overturned, and run into the front room in his night-dress. What followed, as well as who was the murderer, was of course wholly unknown on the morning of the discovery of the body. The murderer, however, was, by means of a most skilful investigation, detected on the following day, in the person of one Lücke, a journeyman smith; and I may at once mention, that he had set up a most consistent plea in defence of himself, inasmuch as he confessed the burglary, but asserted, that he had been attacked by the person robbed, and had killed him in self-defence. The body was when found clad in a night-jacket, shirt, drawers, and stockings, all of which articles of clothing, except the soles of the stockings, were soiled with blood. Beneath the head of the body there was a very large pool of blood, and about two feet from it a second, and between these no connection, not even of the faintest character could be traced. In the kitchen, the walls, utensils and door, &c., were much besprinkled with blood. It was both kitchen and workshop, and the walls were hung with many implements of a tinsmith's art; at the feet of the corpse there were two iron hammers, on the threshold of the kitchen a third, and in the shop a fourth all more or less soiled with recent blood. At the autopsy, *twenty* wounds were found, on the head, face, and neck, and besides these, *sixty-four* ecchymoses, abrasions of the skin, &c., were found on the trunk and extremities! The most important discoveries internally, were: complete smashing into many pieces of the left temporal bone, and of the great wing of the sphenoid bone; comminuted fracture of the right orbital plate of the frontal bone; the lambdoidal suture on the left side was opened up, four wounds penetrated the brain and its membranes on the left side, accompanied by an effusion of dark, coagulated blood; the base of the skull was fissured across from the

fractured wing of the sphenoid to the *sella turcica*, and the generally anæmic state of the body was most remarkable. The medical inspectors were required to answer in their report, *ten* questions propounded with the view of discovering the mode in which the murder had been committed, taking into consideration both the results of the autopsy and the declaration of the perpetrator,—a task verily, as we shall see, not without its difficulties. In our report we stated: "There lie before us at present the minutes of two precognitions. At the first precognition the accused deponed, 'After I had stepped into the kitchen, I removed a small desk from the shop adjoining, placed it on the floor of the kitchen, and broke it up, without finding any money in it. I now went into his bedroom, in which Bontoux was lying snoring in his bed, and there took money both out of a table-drawer, and also out of a pocket-book (£2. 5s. in all), and then left the bedroom, B. seeming still to be asleep; but I had scarcely reached the shop, when B. following me, seized me by the shoulders and threw me down, struggling with me for some time on the floor. At last, I tore myself away and fled to the kitchen, intending thus to leave the house, but B. followed me, and seized me by the neck. Betwixt the kitchen-door, the fireplace, and the desk, we struggled for some time and fell at last together on the floor, sometimes B. and sometimes I was uppermost; once, when I got above him, I seized a hammer lying near the window, and with it struck Bontoux five or six times on the head, who thereupon began to shriek and to call for help, still seeking to detain me. After a struggle of about half-an-hour I tore myself away from B., threw the hammer away in the kitchen, and rushed into the bedroom, to strike a light and see how I could get out of the house. I wiped my bloody hands on a towel in the bedroom, struck a light and went with it into the front room. As I passed the kitchen, I looked in, and observed that B. had got up and was standing close to the kitchen-door, his face was very bloody, and he was calling for help.'" After this, the accused states, that he went into the front room and escaped out at the window—on which distinct stains of blood were found. Of the four blood-stained hammers produced he recognised only one as that used by him, asserting, "I have not used any other weapon in my struggle with B., I have struck with *only one* hammer."

"At the second precognition of Lücke, his statements deviated very materially from those just related as having been made at first. It is particularly important for us that he now states, after relating

the struggle in the kitchen, that he seized the hammer from the window whilst lying '*under* B., who held me fast by the neck, I took it in my right hand and struck upwards, perhaps twice, on B.'s head, who then loosed his hold and stood upright, saying, 'I'll catch you again immediately.' I then sprang up and fled, but was again seized and held fast by B., who stood with his back against the door. Whilst standing here, I gave B. four or six blows on the head, and the blows fell with a thump. I did not count the blows, there may have been more than six. I now tore myself away, and I do not know whether B. remained standing or fell.'" The deposition now proceeds exactly as at the first precognition, deviating only in so far as he now states, that on passing the kitchen he saw B. standing upright, but he did not cry; whilst in the course of the same precognition he again asserted the contrary, and replied to the representation that this could not have been possible, that it was not very loud, but in a kind of whisper. On being accused of having taken two pocket-handkerchiefs besides the money, a fact he had concealed, he confessed the robbery, and repeated, that his sole object was to get away from B., and that he did not intend to kill him. Having now, first of all, to determine the cause of Bontoux's death, we may state, that it is so evident that the cranial injuries have been the cause, that even the most ignorant person cannot for one instant doubt it. Since not only was there no other cause found in the body, not even, as we have expressly stated, the signs of an accidental strangulation, as the extremely bloodless state of the lungs, heart, and large blood-vessels, and the normal condition of the larynx and trachea sufficiently testified, but the protocol of the autopsy enumerates no fewer than *twenty* wounds of the head and neck, some of which, as the dissection proved, were connected with the most important internal injuries. In particular, the whole left of the cranial bones was completely shattered, so that the bones forming the base of the cranium were fractured and fissured by the smashing, and finally, the suture connecting the occipital bone with the others (the lambdoidal), was broken up. Such a shattering of the cranial bones must of necessity, and under every possible circumstance, produce so violent a concussion of the brain and disturbance of its organic life as to be of necessity followed by death, and that so rapidly, that its advent must be reckoned by minutes, or at the latest, by hours. Giving due consideration, therefore, to the numerous other injuries of the head, we assumed in our summary opinion, and this view we hereby repeat

and ratify, viz., (1.) "that Bontoux's death was inevitably due to the cranial injuries; (2.) that he" (and this we were expressly asked) "*could scarcely have lived above an hour* after receiving the most important injuries." In our summary opinion we also stated, that the injuries to the head, face, and neck, might very probably have been produced by the heavy hammers therein described. Now, the accused, in his so-called "open confession," in which, however, he has, as we shall show, deviated widely from the truth, has acknowledged having made use of one of these hammers, whilst he has in reality made use of several of them repeatedly, and in notorious contradiction with the pretended self-defence in which he alleges the murder to have been committed. The appearance of both the hammers and of the body speaks against him. On several of the hammers we find not only a sprinkling of blood as Lücke states, but large and true blood-stains, particularly round the edges, which could not have arisen from a chance sprinkling, whilst the edges of the wounds on the body are partly sharp and partly rounded, thereby evidently denoting the previous use of more than one weapon, a supposition further supported by the fact which we shall prove, that these various wounds must have been produced at different times. The accused says, that he flung the hammer away after having struck with it. Certainly, there was one blood-stained hammer found on the threshold of the kitchen, another also, blood-stained, still further from the body on the shop-table, and two other bloody ones were found lying at the feet of the corpse. This also tells against the accused, and in favour of our supposition, for it is not to be supposed that these hammers—independent of their blood-stains already mentioned—should be by chance lying in all these various spots, while all the other tools hung in proper order on the wall. Whilst, if we suppose the position and appearance of the hammers to have been caused by the murdered man making use of them against the accused, as the latter gives to understand, by stating that Bontoux had, whilst wrestling with him, something hard and heavy in his hand, with which L. particularly states he was struck on the shoulder, this supposition is completely disproved by the examination of Lücke's body, which took place on the 24th of March, the day following the commission of the deed, when I, Casper, one of the subscribers of this report, found no trace of hammer blows upon it. The statement made by Lücke at the second precognition in regard to this, viz., that the mark of the blow upon the shoulder was

no longer visible, because he had been clothed at the time of its receipt, is untenable, since his clothes could not have so lessened the effects of a blow from a heavy hammer—no light blow certainly, but given with all the despair of a man struggling for his life—so much as to make it perfectly invisible after the lapse of only about thirty hours. Moreover, supposing L.'s statement true, there must have existed a difficulty of moving the whole left upper extremity; but this was not observed at the examination on the 24th, the accused having clothed himself without assistance, never having mentioned its existence, and not even simulated it. From all that we have just recited we conclude: (3.) That *Lücke has made use of several hammers* to complete the deed."

"After we had shown with what the wounds had been inflicted, the next and most important point was to discover in what order of time they had been produced. According to the statement of the accused, the fight lasted for half an hour; it is, however, quite impossible either to deny or confirm this statement, but this is unimportant, as it can with certainty be proved that the struggle did last a considerable time. For the innumerable injuries on the body are divided into three classes—slight, serious and of themselves dangerous to life, and absolutely lethal. To the first class belong those numerous marks described in the protocol of the autopsy as blue, brownish-blue ecchymosed patches over the whole of the limbs, which have indubitably been caused by blows, falls, and knocks against hard bodies; these injuries may not have been received first in the order of time, but they were certainly not last, these being much more probably the absolutely fatal injuries already detailed; and we must repeat, what we have already stated in answer to queries put to us, that the deceased after the receipt of such injuries *could no longer have been able to stand upright, to stand or walk*, could not therefore any more have fallen or been knocked down, &c., but must have lain death-struck. On the other hand, this cannot be asserted with the same incontrovertible certainty of those injuries termed by us severe and dangerous to life, in respect to which experience teaches us that they are not incompatible with the duration of life for some time, nor with the continuance of consciousness, though that may be somewhat obscured. Amongst these injuries we include those existing *over the frontal bone, about the root of the nose, upon the lower jaw and the left eye*, these injuries, and *these alone, displayed ecchymoses*, affording thereby a certain proof that life must have been prolonged for some time

after their receipt. By these details we are forced to believe (5.) that Bontoux was probably at first repeatedly struck, knocked about and thrown down; (6.) that he was then struck with a hammer in the forehead and face, and *last of all,* while he yet lived and had again raised himself to his feet (7.), that the worst and *most fatal* blows were then struck upon the posterior part of the left side of the head. The very remarkable discovery of two separate pools of blood in the kitchen in which the body was found is completely in unison with this supposition, but this point we do not now require to enter upon. If we now inquire as to the manner in which the struggle has been carried out, we shall find that the accused, instead of making an "open confesssion," has only fabricated a lie. And this is proved by the complete contradiction between his first and second statements, which only agree in differing from the results of the autopsy, and in no other point. According to his second statement, he lay under Bontoux when he gave him the first (two) blows on the head. It is evident these could not have been the blows upon the forehead and face! Previous to the autopsy it would have been difficult for any one to understand how one person lying beneath another could strike that other on the back of the head, where one of the fatal injuries was found. After the autopsy such a supposition was perfectly inadmissible. For, besides that even a strong man, a journeyman smith, accustomed to use the hammer, could not in such a position possess the power to inflict so violent a blow as would break open the lambdoidal suture, a feat which requires the exertion of considerable power and a full swing of the hammer; the accused proceeds in his further statement to give himself the lie when he deposes, that Bontoux after *these* first blows (which could not have been those inflicted on the forehead and face), said these words—"I shall catch you again immediately," stood upright, and, still standing, seized him again by the breast and held him fast. It is *impossible* for any one to have so acted, whose skull had been fractured as his had been, because the force necessary to produce this fracture must have occasioned such a concussion of the brain as must have instantaneously deprived the wounded man alike of consciousness and of the power of moving. We must therefore conclude (8.) that *Lücke could not have been lying under Bontoux* when he gave him the first blows on the head. The accused, however, confesses at his second precognition, that after B. had risen from the first blows and seized him afresh, he struck him four—six blows upon the head. "*Bontoux,*" says he, "*stood with*

his back close to the door of egress;" and he has no suspicion that in this deposition he makes a statement aggravating to the utmost his crime, the importance of which in a criminal point of view it is not our part to show; we have only to point out that even this "open confession" is entirely contradicted by the results of the autopsy. At the autopsy we found three external wounds corresponding to the important fracture through the lambdoidal suture we have already described. We have already pointed out that this wound at the back of the head could not have been produced during the first struggle, whilst the accused lay beneath the murdered man, as he says he did. It is perfectly self-evident also, even to a non-medical person, that Lücke could not have given such blows with a hammer on the back of the head of a person "*standing with his back close to a door.*" At the same time we agree that all the other injuries to the face and head must have been produced whilst both were in the erect posture. Bontoux, at the instant that he received the blows on the back of the head must of necessity have presented the back of his head to his assailant, *i.e.*, Lücke must have stood behind Bontoux, either because B., already sore wounded, sought to flee, or he had been hurled from him by Lücke, and so had his position reversed, or lying on the floor he had sought again to rise, and so exposed the back of his head; but these minutiæ we cannot ascertain from our point of view, it is sufficient to say that for the reasons given we must conclude (9.) that Lücke *stood behind* Bontoux when he dealt him the fatal blows upon the back of the head. Finally, what was the position of the deceased when he received those blows by which the left side of the skull was smashed, cannot with certainty be determined. It is quite likely that the deceased at that moment stood or sat before Lücke, who struck him a powerful side-blow with the hammer, and it is just as likely that he lay on the floor and that the blow was struck from above downwards. When, however, we reflect that the blow on the back of the head must have been given when the deceased was in the position already mentioned, that this blow could not have been given *after* that which shattered the left side of the head, because *after it* the deceased must have at once fallen to the ground, and could only have exposed the back of his head by falling on his face, which had evidently not been the case; when we reflect, then, that the blow on the back of the head must have preceded the fatal blow on the left side of the head, it does seem to us in the highest degree probable (10.) that Bontoux,

already *lying death-struck on the ground,* received in this position the final and fatal blow referred to. After the explicit statement we have just made, we consider it quite unnecessary to pay any attention to the further statement made by the prisoner, that, as he fled he saw Bontoux standing in the kitchen, or to inquire whether B. called for help or did not call for help, or called only in a low voice—for in this way he contradicts himself; for we fear no contradiction to our positive assertion, that it is utterly impossible for any man, having received such injuries of the skull and brain, and having lost so much blood as the deceased was found to have done, within a short time thereafter to be able to stand upright, or call for help, and consequently to possess complete consciousness."

On the other hand, we feel bound to make the following statement:—

The foregoing narrative, particularly in regard to the bruise marks, &c., on the body, fully prove that a struggle has taken place.

That Bontoux defended himself is proved by the marks found by me, Casper, on the body of Lücke on the 24th of March—viz., nail marks behind both ears, a few scratches on the left eye, injury of all the knuckles on the right hand and of the right thumb, according to the allegations of Lücke; but these are only so far probable, the injury to the knuckles is certainly to be referred to some former scuffle; L. alleges, however, that all the other trifling injuries were given him by Bontoux, and he states that the injury to the right thumb was caused from a bite by B., *but the wound has no such appearance.* We assent, however, to the fact that there was a struggle. But I, Casper, have not found any proof that during that struggle, Lücke has ever been thrown to the ground, not even one ecchymosis, &c., on the face, head and rest of the body, such as was to be expected after repeated falls and throws, and such as did, indeed, exist in countless numbers on the body of Bontoux, and ought to have been visible on the body of Lücke, examined as he was so shortly after the commission of the deed. From this we are justified in concluding that Lucke, powerful, prepared, and wide awake, has always maintained the upper hand in his struggle with Bontoux, less powerful, unprepared, and just awakened out of deep sleep."

Lücke steadfastly maintained his plea, and I my opinion, at his trial. He was condemned to death, and executed.

CASE LXXI.—COMMINUTED FRACTURE OF THE SQUAMOUS AND PETROUS PORTIONS OF THE RIGHT TEMPORAL BONE, AND OF THE LOWER JAW. WHAT HAS BEEN THE POSITION OF THE MURDERED MAN?

The following case of robbery and murder was not less important than the preceding, and attracted universal attention at Berlin, not more from the horrible atrocity of the crime, than from the very remarkable verdict of the jury. On Sunday, the 16th November, 18—, Wilhelm Haube, aged 18, apprentice to the tailor Nolte, having spent the afternoon and evening in amusement abroad, and having overstayed his leave of absence, was admitted on his return by his master's housekeeper, with threats that he would be well beaten next morning; the other members of the family, viz., the master, now murdered, and his daughter, were already in bed. The accused began to reflect on his position; his debts came also into his remembrance; he did not lie down, but made up his mind to carry out a resolution formerly entertained, of emigrating to America, equally suddenly resolving to get the money necessary for this by robbing his master, with whom he had hitherto been on a most friendly footing, and who had always treated him most kindly. With this intent, towards midnight, he slipped quietly into the room in which his master slept upon a sofa-bed, and in which also stood the secretaire; he took the key of this out of his master's morning-coat, which lay over his couch, and commenced to rob, when his master made a movement. He shrunk back terrified to his bedroom, and sat down upon his bed, to await his master's sounder sleep. About half-past two in the morning he stopped the pendulum of the wall clock in his room, and again went into the bedroom, but this time armed with an axe, taken from the adjoining kitchen, "to defend himself against his master," in case this should be necessary. Again, at the commencement of his robbery, he was startled by the voice of his waking master, calling, "Who's there?" "Now," says he, at the precognition on the 20th November, with which the others agree tolerably, "now I went rapidly up to the head of the sofa-bed, and struck, rapidly, one after the other, two or three blows with the axe in the dark towards the white figure that *sat upright in the bed.* My master called out aloud, 'Oh, God! oh, God!' and then with a louder voice, 'Lord Jesus! Lord Jesus!' After the blows from the

axe he had fallen down, and had again raised himself; and as he called 'Lord Jesus!' so loud, I believed he might get up, and I should be lost." He, therefore, quickly brought an ordinary table-knife, and commenced to stab his master, the latter meanwhile, endeavouring, as stated at the time of the examination, to wrest the knife from him. "With both hands he seized my left hand"—we may here mention that the accused is left-handed—"drew me towards himself on the bed, and scratched my hand with his nails," the traces of which were quite visible on the back of Haube's hand at his examination. After his fatally-wounded master had sunk down and become quiet, the accused proceeded to perpetrate the robbery, and to this end he now lighted a candle, and then put into his pocket about £10 10*s.* in bank-notes, an opera-glass, a pair of spectacles, &c. He then washed the blood off his hands, took off his blood-stained linen, and departed about four in the morning. He went to his brother, who lived some distance off, told him he was going to America, and had stolen the money needful from his master; then, as it was yet too early, he wandered about the streets; in the morning he bought *bon-bons*, to eat "on shipboard," and breakfasted at the railway station, and went by the first train to Hamburg, whither, however, the telegraph preceded him. He was at once apprehended upon his arrival, precognosed, and subsequently sent back to us. From the first he acknowledged the deed, with all its circumstantialities, and remained firm to his confession. On the 19th we made the medico-legal examination of the body, and found the following important particulars:—The shirt and the whole body was soiled with blood, the features were remarkably distorted; there were *forty-two* injuries upon the head, face, neck, shoulder, superior extremities, and the fingers, which were much cut; these were partly only ecchymotic marks, partly clean cuts, partly bloody scratches (with a knife), and lastly, marks of two violent blows. One of these had comminuted the squamous and petrous portions of the right temporal bone, and from this fracture a fissure extended right across the *sella turcica*; the second blow had smashed the lower jaw on the right side, torn across its artery, and cut across cleanly the superior thyroid artery. The whole body was anæmic. The following special questions were laid before us to be answered in our report:—(1.) Could the wounds upon the deceased have been inflicted with the axe and knife produced? (2) Which of these wounds are to be referred to the axe? (3.) Whether the deceased

when struck by the axe must have lain upon his left side, or whether he might have been sitting up? (4.) How long might the deceased have lived after the receipt of his wounds? After pointing out in our report, that the comminuted fracture of the skull must have been the cause of death, which from the self-evidence of the matter we here omit, we continued:—"You ask us how long the deceased might have lived after receiving his wounds? The facts mentioned in the legal reports, coupled with our medical experience, enable us to answer this query. The accused asserts it to have been about half-past two a.m., when he for the second time entered the bedroom, *i.e.*, commenced the murder. He asserts further in all his examinations, that at his departure about four in the morning, his master, though fatally wounded, still breathed, and the housekeeper Estrich depones, that she found her master quite dead on entering his room in the morning after eight o'clock; therefore, he must have lived at the shortest one hour and a-half, and at the longest six hours and a-half; and here, for completeness-sake we may state, that the remark of Drs. X. and Z., who were called in, that those parts of the body under the bedclothes were still warm at three-quarters past eight a.m., is quite unimportant, as, under such circumstances, the body may retain its heat for many hours, frequently even till the next day. Experience, however, teaches us, that we may reasonably suppose the deceased to have lived two or three hours after the receipt of the injuries; for, although the hæmorrhage from the many wounded blood-vessels, many of them important, must certainly have been very considerable, as is proved not only by the linen of the deceased, which seemed as if soaked in blood, but also by the general anæmia of the body found at the autopsy, yet we must not forget, that the concussion of the brain, caused by the two blows on the head, must have necessarily so far lowered the powers of life as to prevent any rapidly fatal arterial hæmorrhage, while experience teaches us, that persons affected with a similar concussion of the brain proceeding from similar causes, even to the extent of fracturing the base of the skull, have often lived much longer than we have in this case supposed. Considering all the circumstances, however, the hæmorrhage from the many wounds, the great number of these, and the injuries to the head, we believe ourselves justified in fixing the period of death as we have done." "Further, we can answer with perfect certainty the question: 'Whether the injuries of the deceased could have been inflicted with the axe and knife produced? confirming our affirma-

tive answer to this question given in our summary report at the time of the autopsy. Independent of the fact, that the weapons shown were covered with blood, the character of the injuries were evidently to be referred to a sharp-cutting weapon, and to a blunt-cutting one wielded with considerable force, as is plainly shown by their partly sharp and smooth, partly irregular edges, and the comminution of both soft and hard bodies; and as the point of the table-knife was found broken off, the accused confessing, and the autopsy testifying, that he struck with it against hard parts (the skull-bones), so this circumstance adds to the great probability, that these weapons not only might have been used, but that they actually were employed."

"No greater difficulties surround the question laid before us—'Which of the injuries are to be referred to the axe?' Indubitably those which have produced comminution of the hard bones and laceration of the soft parts, *i. e.*, the two severe blows on the head, that upon the right lower jaw, and that upon the right temporal bone, which presuppose the employment of a heavier and blunter weapon than a table-knife and yet a bluntly-cutting one that can separate and lacerate the soft parts, consequently just such a weapon as an axe."

"We have now finally to reply to the fourth question—'Whether the deceased when struck by the axe must have lain upon his left side, or whether he might have been sitting up?"

The housekeeper Estrich, from long-continued personal observation, and the foreman Rätzsch, from having frequently heard Nolte say so, have both testified that the deceased was in the habit of "always" lying in bed upon his left side with his face to the wall. We may, therefore, suppose that, as usual, on the night between the 16th and 17th of this month, when the accused fell upon him, N. was sleeping on his left side; and the situation of the fatal wounds of the jaw and skull upon the right side is in favour of this supposition. In considering this question, however, it is of importance to reflect how the body was found in the morning. As we ourselves have seen, the deceased lay with the upper part of his body upon the *right side*, whilst the lower part of the body, particularly the hips and upper part of the thighs, lay with their foreparts on the bed, the hands lay together in a bent position, &c. It is evidently *impossible* that the deceased could have been lying in *this position* when he received those injuries, which were not even visible until the body had been turned round, because he lay upon them; he must therefore have got into

this position subsequently. Nothing is less likely than that the accused, after committing the deed, placed him in this position; first, because in his open confession of all the particulars of his crime, he has made no allusion to this, and second, because he repeatedly and very credibly states, that he did indeed hear the dying man still breathe, but that from fear he dared not look at him, and he was much less likely to turn his body round without any imaginable reason. If, therefore, the deceased could not have received the injury when lying on the right side, and yet has been found as a corpse lying upon this side, it follows that he *must have been in some other posture* between the times of quiet sleep, being wounded and being found a corpse. The statements of the accused contradict each other repeatedly in regard to this. In Hamburg he stated, "The master did not defend himself, nor seize hold of me," on the contrary, at the time of the autopsy, and at the subsequent precognitions, he repeatedly declared the opposite of this, and, judging from his scratched hand, probably with truth. At the precognition on the 22nd of this month he states that, with the axe held perpendicularly above him, he struck purposely at the head of the white figure *sitting in the bed.* Subsequently, when he for the first time stabbed his master, he says, he attempted to get up, but again during the same examination he states, that immediately after the first stab his master fell down, and he did *not* observe him again attempt to rise. Just so does his statement at the precognition on the 2nd of this month vary from his earlier ones, when he says, "Judging from the voice, my master *appeared* to have turned himself to me (that is, towards the right side), but I do not know this with certainty, and I only struck at the white figure which *appeared* to be sitting in the bed." We must, therefore, appeal for conclusive information to the condition of the wounds. Though we cannot deny the possibility of the wound over the jaw of the deceased having been given from above downwards, and while he was in a sitting posture, yet the perfect comminution of the bone is much more favourable to the view that the axe must have descended upon it at right angles to its surface, *i. e.*, that the deceased must have lain upon his *left* side when he received this blow. That he now sat up is extremely probable, as, after the receipt of such a wound, when awake, he might have done much more, and might even have walked. It is also much more reasonable to assume the *possibility* of the cranial wound having been received in a sitting posture, as the vaulting of the skull causes the

temporal bone to protrude beyond the lower jaw, and its thin squamous portion is much more easily broken and comminuted than the hard and strong lower jawbone. We are, therefore, inclined to assume, that Nolte received the first blow upon the right cheek whilst lying on his left side, that he then sat up, and received the second blow upon the head, and that in the struggle indubitably now begun, the numerous cuts with the knife followed, till Nolte, death-struck and exhausted, fell down, as he was found, and as we have already described. Finally, therefore, we answer the questions put to us as follows:—" (1.) The injuries of the deceased may have been inflicted with the axe and knife produced at the time of the autopsy; (2.) The oft-mentioned wounds upon the skull and jaw have been produced by the axe; (3.) The deceased when struck with the axe may have been in a sitting posture; (4.) The deceased may have lived two or three hours after the receipt of the injuries."

I may add, though not in place here, that the jury gave it as their verdict: that Haube perpetrated the deed "wilfully, but not with deliberation" (!), and he was consequently (according to § 176 of the Penal Code) condemned to imprisoment for life, and this punishment he is now suffering in the prison here.

In the following case of robbery, with murder, the decision of the question we are now illustrating was much more easy than in either of the two already related.

CASE LXXII.—COMMINUTED FRACTURE OF THE RIGHT PARIETAL AND OF THE SPHENOID BONES.—HOW DID THE MURDERED MAN LIE, AND WHERE DID THE MURDERER STAND?

On the morning of the 14th of March, 18—, the merchant Schultz was missed, and his murdered body was subsequently found tolerably closely packed in the box of his sofa-bed. On the same day, and almost immediately after the finding of the body, Friedrich Holland, the house-servant of the murdered man, was arrested, for want of a passport, at the station of the Hamburg Railway, on the wing for America *viâ* Hamburg; and he immediately confessed that, to obtain money for the support of his sweetheart and his child by her, he had murdered his master as he lay in bed sleeping, about 8 o'clock on the previous morning. At the precognition, which took place that evening, he gave the following more detailed

account of the mode in which the deed was committed. "After I had satisfied myself that my master, who lay upon his left side with his face to the wall, was still fast asleep, I took from under my coat the kitchen axe, which I had taken out of the kitchen, seized it by the lower part of its handle, and struck with the back of it from above downwards upon my master's head, hitting him upon the temple. Immediately on receiving the blow, my master, uttering no sound, raised up his head, which I then struck at twice, and this time more on the top of the head, and the head again sunk down, still without a sound. As my master still breathed stertorously, rattling in his throat, I rushed to the kitchen to fetch a strong cord with which to strangle him, for I feared that the rattling would get louder and would be heard by others. I took the cord to the head of the bed, drew the body, covered only with a shirt, so far out of bed that the head hung down. I then held the one end of the cord firm, and wound the other three or four times round the neck, so that it should press first upon the larynx, and then brought the end of the cord round to the front of the neck, where I made a knot so that it should hold firmly." He then went on to state how that not to leave the body lying openly and visibly in the bed, he took it out of it, packed it in the box of the sofa-bed, and nailed down the lid, how he now completed the robbery, and how he had lived up to the time of his arrest.

On the following day the autopsy took place, and it was peculiarly interesting from the fact that here a *dying man had been strangled.* In the first place, we found a quarter of an inch thick hempen cord, wound fivefold round the neck, and that so tightly that the finger could not be inserted beneath it. After removal of the cord, there was seen a furrow one quarter of an inch broad and two lines deep, running from four to five times round the neck, chiefly of a white colour, but here and there stained with patches of blue and of dark red; this depression was quite soft to cut and displayed no ecchymosis. The whole of the right parietal bone was broken into many fragments, and the coronal suture separated throughout its entire extent. The right orbital plate of the frontal bone was fissured. A piece was broken off the right great wing of the sphenoid, and a piece three inches long from off the squamous portion of the right temporal bone. A fissure extended through the base of the skull right across the *sella turcica.* The lungs were anæmic; the large thoracic blood-vessels, and the cardiac cavities, almost empty of

blood; the larynx and trachea were uninjured, pale and empty; every other organ was normal but anæmic.

Now, as respects the questions to be answered in our report, we had here the direct opposite of the case of Lücke already given, for in this case the results of the autopsy completely agreed with the open confession of the culprit. In the first place, as to the direct cause of death, it was evidently easy to prove that the death was caused by the cranial injuries, and not by the strangulation, for no single sign of death by strangulation was found, and consequently the deceased, if not already dead, and in opposition to this the deposition states, that he still breathed with a rhonchus (tracheal râle), yet he must have been already *in agone mortis* when the prisoner wound the cord round his neck, for doing which he gave a very credible reason, and one confirmed by the experience of similar cases. "Next, as to the weapon," we continued, "with which these injuries have been inflicted, independent of the prisoner's confession, or should he subsequently retract it, we must conclude, that a heavy blunt-edged weapon provided with at least one four-sided surface—such as an axe or hammer—must have been the lethal weapon. Only contusions produce such injuries as here exist, and the regular four-sided ecchymosis over the zygomatic arch proves that a four-sided weapon has been employed. The common kitchen axe produced has, however, an indented blunt-cutting edge, and the usual four-sided back, its edges being almost sharper than the proper edge itself. From this condition of the axe it is evident, that only the last-mentioned injury, the ecchymosis on the cheek, has been certainly caused by the back of the axe, whilst the other external injuries might have been produced just as well by the front or edge of the axe, as by its back. The further statement of Holland, that his master lay upon his left side when he struck him, has been confirmed by the autopsy, as all the injuries have been found upon the right side of the head, whilst the top of the head and the left side are quite uninjured. But it is also evident, from the nature of the internal injuries, that the deceased must have been lying when he received the fatal blow. For, besides that, daily experience teaches us, that when the victim stands or sits before his foe, the blow is much more likely to strike the *left* than the right side, in this case the force employed has been so great as to separate an entire suture, and has, therefore, more probably resulted from a blow directly downwards, than from a side-blow. As to the position of the murderer, we must suppose that he stood be-

hind, and, as it were, above the head of the bed, for only in this position, and not if he had stood in front of, and as it were, below the head of the bed, could the four-sided ecchymosis on the cheek be produced, which was caused by the back of the axe when delivering a blow which fractured the bones lying beneath. In accordance with the foregoing, we delivered our opinions in regard to the questions laid before us:—(1.) That strangulation had not been the cause of Schultz's death; (2.) That the cranial injuries had been the inevitable cause of his death; (3.) That these injuries evidently point to the employment of a partly blunt and partly sharp weapon, which must have been used with considerable force; (4.) That the kitchen axe produced, or some similar weapon has been employed to inflict these injuries; (5.) That the four-sided ecchymosis mentioned, has been caused by the back of this weapon, whilst the other external injuries may have been caused partly by the sharp edge, and partly by the blunt back of the weapon; (6.) That the deceased must have been wounded and killed while lying on his left side; (7.) That from the nature of the ecchymosis mentioned, we may conclude that the murderer must have stood above, and as it were, behind the head of the bed; (8.) That from the high state of preservation of the body, coupled with the mild temperature then prevailing, the death of the deceased, must have preceded the autopsy but a few days, and it is very possible that the exact time may have been about fifty hours (this was in answer to a direct query)."

Holland was executed.

The following case of a charge of murder presented no difficulties, though it afforded a most striking example how futile the most obstinate lying is, when placed in opposition to a medico-legal opinion deduced from the results of the autopsy.

Case LXXIII.—Murder by injuries of the Head.—In what position has the deceased been?

A joiner struck dead (with a heavy file weighing about one pound fourteen ounces, imp.) his wife, aged 55, with whom he had led a quarrelsome life. The thinness of all the skull-bones in this case was more remarkable than I have ever seen either before or since, and was rendered especially so by occurring in a case of cranial injury. The surface of the skull-bones where they were sawn through all round, were nowhere above a line in thickness; fortunately, the case occurred under the new Penal Code, and therefore

gave rise to no unprofitable discussions with the defender, as to the absolute or individual lethality of the injuries; it would verily have been difficult for him to maintain the latter view of the case; but he might have succeeded in protracting a very simple matter through the various courts. The whole of the left half of the skull was broken to pieces; ten fragments of bone taken out of this wound lay before us at the medico-legal examination of the body; the base of the wound was formed by the reddish-blue *dura mater*, which was lacerated, and from beneath which the cerebral substance protruded through the wound. The left hemisphere of the cerebrum was completely crushed, and both it and the left side of the cerebellum were thickly beset with dark coagula. A horizontal fracture passed to the right across the frontal bone into the right orbital process, where it ended. The whole of the brain was covered by a thin layer of treacly blood. The *plexus choroidales* were very pale, all the sinuses almost empty of blood. In determining the position and posture of the wounded person at the time the deed was done a second wound proved a great help; this was about an inch and a-quarter long, but slightly patulous, its edges obtusely sharp and slightly ecchymosed; it ran immediately over the left ear from behind forwards, and from above downwards diagonally. The rest of the autopsy was of no consequence, affording only, as was to be expected, additional evidence of the general anæmia. We gave it as our decided opinion, that the injury to the head had been inevitably the cause of death, that it might very readily have been inflicted by the heavy file produced; that the deceased at the moment of its receipt had not been in a horizontal position (against which the wound above the ear testified), but might have been either standing or sitting, and the murderer might have stood either before or behind her. The husband was brought forward at the time of the examination, and stated, that his wife was sitting knitting on a bench when the quarrel arose, and that he, standing before her, seized the file and struck her.

CASE LXXIV.—FATAL COMMINUTED FRACTURE OF THE SKULL WITH AN AXE. HAS IT BEEN DONE WITH THE EDGE ALONE, OR ALSO WITH THE BACK?

The following case, that of a father, the weaver D., who struck dead his son, aged 14, while sleeping quietly, was still more horrible than any of the preceding cases, and resembled them much in the

results of the autopsy. The blow was given with the axe produced, as was proved by the other members of the family, who being in an adjoining room heard the sound of the falling axe, and immediately hurrying in, were almost eye-witnesses of the deed; the blow had cut through the epicranial aponeurosis and skull-bones with a clean sharp-edged cut, and penetrated the brain deeply, and appeared on the body as a wound on the left side, three inches and a-half long and one inch wide, from whose edges, and from amongst the crushed brain at its bottom, several loose pieces of bone were taken out. The face, shirt, and upper extremities were much covered with blood. The body was of a waxy-white, affording thereby, along with the size of the wound, certain evidence of the complete anæmia, which was subsequently most strikingly displayed in the almost greyish-white and bloodless lungs; in the perfectly bloodless heart and pulmonary artery; in the pale and bloodless liver, and in the almost empty *vena cava inferior*, &c. Nevertheless, even in this case, the usual post-mortem staining was not absent (*Vid.* § 8, page 19), but covered the whole of the back. I may also add, that from the right angle of the cranial wound a zigzag fissure extended horizontally across to the right temporal bone, and there was also a fissure in the base of the cranium across the *sella turcica*, not, as usual, right across and through the bone, but winding angularly beneath the *sella*, and separating the *pars petrosa* of the right temporal bone. Upon the *corpus callosum* there lay dark lumps of coagulated blood, and similar clots were scattered here and there through the brain. The boy had died instantaneously without awaking. In this case also, therefore, the blood had coagulated after death (*Vid.* § 11, page 23). The decision as to the nature of this case was extremely simple. It was not so easy, however, to answer the question:—"Did the murderer strike only with the edge, or also with the back of the axe?" On the *latter* there were not only blood-stains like those on the rest of the blade, but there were adherent also fair hairs from off the corpse. Though, however, the nature of the wound permitted us to assume with something like certainty, that the sharp edge of the axe had been used to produce it, blood and hair on its back could not justify a similar conclusion. We rather supposed that the hair cut off had been washed out by the streaming blood, and this supposition was confirmed and made certain, after we had ordered the production of the pillow on which the boy's head lay when he was struck, for upon it we found not only large blood-stains, but two large pieces of cere-

bral substance, and a tolerable heap of fair hair matted with blood! It further came out that the murderer was labouring under melancholia; the preliminary investigation was therefore cancelled, and the poor man sent to an Asylum for the insane, where he subsequently died.

CASE LXXV.—PENETRATING WOUND OF THE HEART.—WAS THE DECEASED STABBED, OR DID HE HIMSELF RUN UPON THE KNIFE?

During a quarrel among some woodcutters, on the 25th of August, 18—, S. was thrice stabbed by Helm, and immediately fell dead. We quote the following description of these wounds from the protocol of the autopsy:—"About the middle of the left arm, on its inner side, there was a crescent-shaped wound one inch and three-quarters long, three-quarters of an inch wide, through the skin alone, with sharp, dry edges, not ecchymosed,—on the left breast near the axilla, and one inch and a-half diagonally above the nipple, there was a crescent-shaped wound two inches and a-half long, one inch and a-quarter wide at the centre, and from the bottom of which a bundle of muscular fibres protruded. On the same side of the breast between the fifth and sixth ribs, and about one inch and a-half from the nipple, there was a wound with similar edges, slightly crescentic in form, one inch long, and one inch and a-quarter wide, running from above downwards and from within outwards." After opening the thorax, it was found that both wounds had penetrated, and approached each other, so that "there was only half-an-inch between them. The lower wound was of a crescentic form, three-quarters of a inch long, and with sharp unecchymosed edges; the other wound was more like a simple hole, one-quarter of an inch in diameter, and had similar edges. In the left pleural cavity there were twenty ounces of dark and perfectly fluid blood. At the base of the pericardium, close to the diaphragm, there was a crescent-shaped wound half-an-inch long and three-quarters of an inch broad, with sharp edges, deeply ecchymosed to the extent of half-an-inch all round. In the pericardium there were also four ounces of blood similar to that already mentioned. At the part of the heart corresponding to the wound of the pericardium, we found a feebly crescentic wound half-an-inch long and two inches broad, with sharp unecchymosed edges, and which penetrated the left ventricle." The rest of the autopsy was of no consequence. The body was generally anæmic, excepting only (as usual) the cerebral veins. Nothing could be more

easy than to determine the inevitable fatality of such a wound, and to confirm the supposition that it might have been made by the pocket-knife produced, the blade of which was four inches long, and three-quarters of an inch broad in the middle, very pointed and very sharp. But at his trial the accused for the first time asserted, that he had not wounded the deceased, but that, as S. threatened him with an uplifted log of wood, in self-defence he held the knife before him, and S. himself ran upon it; this plea was eagerly seized by the advocate for the defence, but it was only too readily swept away by confronting it with the result of the autopsy. The wounded man had been thrice stabbed, once on the arm and twice on the breast: this of itself seemed more in favour of some active procedure, than of a mere passive running upon the weapon; moreover, the direction of the wounds was from above downwards, and converged in the chest at their lower ends. Repeated stabbings with an uplifted arm, explained the origin and direction of these wounds, just as easily and naturally as it was difficult to conceive how the deceased could have received three, and three such wounds, by simply running upon the knife. Our opinions prevailed with the Jury, and Helm was condemned.

Case LXXVI.—Fatal Stab in the Thigh.—Was it intentional or caused by falling on the knife?

The following case was very similar to that just related. An extremely passionate and very drunken man, who had often ill-used his wife, fell a-quarrelling with her as he ate, and held a bread-knife in his hand. According to his statement, his wife "upon this stumbled over a stool that stood behind her, and fell forwards, but somewhat to the one side," and he, seeking to prevent her fall, accidentally stabbed her with the knife he had in his hand. The wound was in the back part of the left thigh, and had penetrated about two inches obliquely from without inwards, after passing through a dress, two wadded petticoats, and a pair of drawers. According to the woman, however, "her husband had repeatedly struck her, and kicked her on the side in front," and then, as she turned to the door to flee, he stabbed her from behind. A diversity of statement, obviously of much importance for the public prosecutor! The woman was immediately removed to the Hospital, where an ecchymosed mark was found in the left groin, besides the stab in the left thigh. In three

days' time the glands of the groin were much swollen, in five days the case had assumed a serious aspect, the suppuration became ichorous, and the glandular inflammation likewise ended in unhealthy suppuration, and on the twentieth day the woman died from pyæmia. The body was emaciated, worn out with disease, and anæmic, and in both of the situations mentioned deep unhealthy ulceration existed. It was, therefore, easy to determine the facts relative to the homicide. In regard to the question put to us:—"Whether the stab might have been produced in the manner alleged by the accused?" we answered it negatively, and for these reasons: "His assertions are unworthy of credit: in the first place, because they contradict each other, and are indistinct, or rather indeed incomprehensible; and in the next place, because they do not explain the condition of the body either before or after death. It is manifestly incomprehensible, how a woman could do what M. says his wife did, viz., fall *forwards*, and *over* a stool which stood *behind* her. But the stab itself contradicts any such assumption: it must, as the deceased has correctly stated, have been given with considerable force, since it penetrated two inches deep into the body, after passing through so many elastic articles of dress. If a body were to fall with its entire weight upon a knife fixed beneath it, a similar stab might be the result; but, as the accused himself testifies, that he caught his wife to prevent her from falling, so such a half fall cannot be accepted as sufficient to produce such a wound, and this all the more, that, had it been the cause the direction would have been different, viz., direct from behind forwards, and not as it really is, oblique. On the contrary, the origin of the stab is explained in the easiest and simplest manner, by assuming that the accused, holding the knife in his right hand, forcibly stabbed his wife from behind, as she fled to the door with her back towards him. Moreover, the injury in the inguinal region is not explained by the statement of the accused; while, if we accept as true the statement of the deceased, that before being stabbed, she had been "kicked on the side in front," the origin of this injury is explained in the most natural manner.

CHAPTER III.

ON THE INSPECTION OF ARTICLES OF CLOTHING AND OTHER MATTERS.

§ 42. General Statements.

The medical jurist is not generally required to inspect clothing, shirts, boots, stockings, &c., and stuffs of every kind, as handkerchiefs, rags, bast mats, &c., in which the bodies of new-born children have been wrapped. The Judge presiding at the examination of the body is generally satisfied with ordering such articles of clothing to be properly registered, because they may assist in identifying unknown bodies, and to this end they must also be correctly described in the public advertisements; and in Berlin, the clothes are, with the same intention, hung up in the public deadhouse near the exposed body (as in the Morgue at Paris); in cases of murder, they are at the public trial laid upon the table along with the corpora delicti, and produced to the accused for identification, &c. From time immemorial it has been the custom at Berlin to deliver the body naked to the medical inspectors for further investigation, which is in every way more judicious than the opposite procedure common in other jurisdictions, as may be gathered from the protocols of their autopsies, which commence with a long description of the clothing of the body. For either this clothing presents nothing of importance in a medico-legal point of view, and then, it is improper and vexatious to occupy the time of the physician in describing coats, trousers, stockings, &c.; or these articles, as however, but very rarely happens, may be able to throw light upon the case, because suspicious-looking spots, &c., are found upon them, and then the Judge himself, without any statutory compulsion, which does not exist with us, will be disposed to advise with the medical jurist upon the matter. This will, of course, be done in every case where the position of the clothes in relation to the injuries discovered excites attention and scrutiny. Thus, for example, in a doubtful case of suicide, it must have attracted attention, that the silk-neckerchief over the wound in the

throat was quite uninjured; in two other similar cases, that all the clothes as well as the shirt were uninjured, whilst beneath them lay the fatal gun-shot wound; in another case again, one of rape and murder, that the cap of the unfortunate woman lay between her thighs, &c. The medical jurist must, however, wait until such queries are put to him, and where this is the case, which I repeat is but seldom, they usually refer to the investigation of the stains of blood, ordure, semen, and poisons, particularly of sulphuric acid.

§ 43. On the Investigation of Blood-stains.*

H. Rose (*op. cit.*) treats uncoloured linen or woollen cloths, apparently stained with blood, with cold distilled water to extract the hæmatin, and this solution is then tested with a solution of chlorine, with nitric acid, and with tincture of galls, in the manner already described (page 145). It is much more difficult, however, to investigate stains of blood upon coloured cloths, particularly upon such as are composed of some nitrogenous organic material, as wool or silk. We must in such cases endeavour, in the first place, cautiously to scratch off the dried blood from the cloth,—a procedure which, even when performed with care, is but seldom successful; we must in the next place macerate the matter scratched off in cold water, and then proceed to test the solution of hæmatin (should blood be present) in the manner already described. Where the stains have already been washed with boiling or soapy water, Morin, Professor of Chemistry in Rouen, recommends the following mode of detection: the stains are first treated with a weak solution of pure potash, the fluid thus obtained gives a white precipitate with nitric or hydrochloric acid, thereby evincing the presence of one or more of the constituents of the blood. The alkaline treatment does not discharge the colouring-matter of the blood, and it may be extracted by the use of pure hydrochloric acid, testing this solution with ferrocyanide of potassium, when the presence of the iron of the blood is at once rendered visible. The simultaneous discovery of the presence of iron along with a protein substance is, according to Morin, a certain sign of the presence of blood.† Wiehr employs a somewhat similar method for the detection of blood-stains upon coloured stuffs, where the colour of the solution prevents the employment of reagents, viz., by the production

* *Vid.* also on the investigation of blood-stains on weapons, §§ 39 and 40.

† Archiv der Pharmacie, LXXX. Hft. 2. Jahrg. 1854, s. 192.

of cyanide of potassium by means of the stains of blood upon the stuff. After satisfying himself that the stuff to be examined contains no wool, he roasts a red-stained portion of it in a porcelain crucible till it can be rubbed to powder, this powder is then mixed with carbonate of potash and the mixture exposed to a strong red-heat. The fused mass is subsequently to be lixiviated with distilled water and filtered, and to the filtered solution there is to be added a small quantity of a solution of proto-salt, and also of a per-salt of iron, upon which a precipitate of an undecided colour falls, consisting of the surplus of the carbonate of potass employed, the reduced oxide and peroxide of iron, and the newly-formed ferrosesquicyanide of iron. The precipitate is now digested in dilute sulphuric acid, which dissolves out the oxide and peroxide of iron, and thus renders visible the bright-blue of the ferrosesquicyanide of iron, which is insoluble in the dilute acid. Wiehr asserts, that he has obtained satisfactory results by means of this method, even where the quantity of blood was very minute. This method may be also successfully employed by boiling a piece of the blood-stained stuff in a solution of caustic potass, evaporating the solution to dryness, exposing the residue to a red-heat, and afterwards treating it with the salts of iron and sulphuric acid as already described.*

Bryk commends the detection of the polychroism of the colouring-matter of the blood as a most valuable test, particularly in the diagnosis of such blood-stains as have been washed out, and appear perfectly white on being merely looked at. When such stains are treated under the microscope with concentrated sulphuric acid, in a very few minutes a pale-green coloration of the linen threads may be seen, which in a short time becomes pale-brown, and here and there, where more of the pigment may by chance adhere, a brownish-red, passing afterwards to brick or even to rose-red, this generally taking place in from two to three hours, and the reaction closing by the stain assuming a dirty-brown colour. The transition from green to brown, violet, brick or rose-red, is to be observed in every pale-yellowish stain, whether this faint coloration has existed *ab origine* or been produced by attempts to wash it out; and of course, these colours appear all the more splendid when the stain of blood is concentrated, and thereby afford a most important means of differential diagnosis between such stains and those of pus, urine, or mucus, which upon white cloths might be suspected to be washed-out blood-

* Archiv der Pharmacie, 1854, April.

stains, but which when treated with sulphuric acid do not undergo the change of colour described.*

Pinia, of Turin,† also describes this peculiar metamorphosis of the colour of visible, and particularly of washed-out blood-stains, when treated with sulphuric acid. Our own experimental researches have perfectly satisfied us of the correctness of this statement, and we have had great pleasure in observing the beautiful changes of colour produced by this treatment in recent as well as in washed-out stains, unaided vision being perfectly sufficient for the purpose. But the forensic value of this diagnostic measure is unfortunately much lessened by the fact, that the very same polychroism is also observed when stains of albumen, of the acids of the bile, or even of fat alone, are treated with sulphuric acid dropped upon them, though these may actually contain no blood, as is proved by the failure of all the other tests, which prove its existence in actual blood-stains. On the other hand, Hoppe's mode of treating recent or washed-out blood-stains with caustic soda seems much more trustworthy, this also produces a rapid and very striking alteration in the colouring-matter of the blood, as we ourselves can testify from personal observation. Caustic soda, when dropped upon recent blood or blood-stains which still contain traces of hæmatin, produces in a few minutes a pale or dark olive-green coloration, passing at once into the previous red, or reddish, or yellowish-red colour when acetic acid is dropped upon it, and again becoming green when treated afresh with soda. There is no other colouring-matter that undergoes these changes when thus treated, and this method is, therefore, to be preferred to that with sulphuric acid. Both tests are, moreover, easy of application, and require no special apparatus. When the stains are very rigid, it is better to soften them with a little distilled water previous to applying the solution of soda.

Along with the employment of chemical means to detect blood-stains, we must never neglect *microscopical,* and this all the more, that a recent discovery permits us to hope to be able to detect blood with certainty in this manner, even when the quantity is much too small for its chemical detection. First of all, we must always ascertain the existence of blood corpuscles, and in satisfying ourselves of this we must not neglect the white corpuscles, since their detection,

* Wiener Medic. Wochenschr. 1858, s. 779.

† Demaria, in his notes to the Italian translation of this Handbook, p. 724.

along with the other characteristics, considerably strengthens the credibility of the result. In treating dried stains of blood in the usual manner with water, watery solutions of salt or iodine, &c., very distinct corpuscles are obtained. If many of these, however, are colourless, the probability is very great that it is purulent, muco-purulent matter, or some other pathological product and not blood. If relatively, but few of the corpuscles are colourless, it is all the more likely to be blood. The discovery of fibrine concludes the microscopic examination. This is easily recognised as the material connecting the fragments of blood after they have been for some time exposed to the action of water. A still more important test of blood, however, is the discovery made by L. Teichmann,* that the action of acetic acid upon blood causes the formation of crystals, the constituents of which he recognised as being formed from the colouring-matter of the blood, and he therefore described them under the name of crystals of hæmin. This test is one specially important for the medical jurist, since he has so often to deal with stuffs already rubbed or washed, whereby the blood corpuscles have been destroyed and rendered unrecognisable, whilst some colouring-matter is almost sure to be left, and this will permit of the successful application of Teichmann's test, which enables us successfully to diagnose the presence of blood, whatever may be its condition, recent, dried, accidently fouled, or even stinking and discoloured; and to Büchner and Simon belongs the merit of having so simplified the complicated method of investigation employed by Teichmann and Brücke, that, as we ourselves can confirm, the demonstration of crystals of hæmin is rendered now so simple that it can be done by every medical jurist. Büchner and Simon have indeed proved the existence of blood in a small rag cut from a butcher's slaughtering-trousers which had been eight years in use, but had not been worn for one year and a-half previously.† The following is substantially their simplified process:—A drop of blood or fluid containing its colouring-matter is to be mixed in a watch-glass with an excess of glacial acetic acid, it is then to be slowly evaporated over a spirit lamp or gas jet, or in a sand-bath or oven (or spontaneously in the

* On the Crystallization of the Organic Constituents of the Blood, in Henle and Pfeuffer's Zeitschr. für rat. Medicin, iii. 3, s. 375.

† Büchner and Simon on the Investigation of Crystals of Hæmin, and their medico-legal signification, in the Archiv für Pathol., Anatomie und Physiologie. Neue Folge, Bd. V., 1 and 2 Hft. 1858, s. 50.

air). When the dried mass is now brought under the microscope, innumerable crystals of hæmin are at once seen, when the colouring-matter of the blood has actually been present in the fluid employed, sometimes these crystals are isolated, at others, and more usually, they are present in thousands. These crystals are rhomboidal in form, tabular or otherwise; their colour varies from a faint yellowish to yellow or yellowish-red, or a dirty blood-red, or still deeper colour; their size is various, and they are frequently found placed over one another in a cruciform or stellate manner. When the amount of blood is very small, it crystallizes in such thin tablets and cylinders that they appear quite colourless, and these combine in a fine reticular form, the meshes of which are extremely close. I obtained a very perfect preparation of this nature from a completely faded stain of menstrual blood the size of a cherry-stone, which for three months had adhered to a much-handled piece of linen.* Stains of blood dried upon wood, metal, or stuffs, are most rapidly tested by macerating them in glacial acetic acid in a test tube, till the acid is coloured, and then evaporating the fluid. When the blood-stains are of old standing, it is better to boil them in the acid in a test tube till the acid becomes reddish, and then to evaporate it. In regard to Teichmann's statement respecting the necessity of adding a small quantity of common salt to the acetic acid solution of the colouring-matter of the blood, we can fully confirm the views of the investigators just mentioned, that the addition of salt to recent blood is unnecessary, and is only requisite when the blood has been deprived of its saline constituents by washing with water, by the action of rain, or the ordinary moisture of the soil or atmosphere. We need scarcely remind the reader, that cases of this nature are of frequent occurrence in medico-legal practice, and since one cannot always know whether such influences have been in action or no, so B. and S. very properly recommend, when the first trial without the addition of salt has been fruitless, to make a new one with this addition. Since, however, we have found that the success of the process is rendered much more certain by this addition of salt, so we are disposed to recommend that it be made at once in every case, and that a very small particle of salt be always added to the glacial

* Very good representations of both kinds of crystals are to be found in Funke's Atlas der Physiol. Chemie, 2 Aufl. Leipzig, 1858, Taf. IX. Figs. 2 and 5. *Vid.* also a representation of one of our own preparations, in our own Atlas, Taf. X. Fig. 2.

acetic acid before the maceration or boiling. In every case the experiment is not always successful, and it must then be at once repeated, which considering the simplicity of the process is no great hardship; and it is therefore better, even in the most minute object of medico-legal investigation, to reserve, if possible, enough for a second and third experiment. But even repeated experiments with the same fluids, preparations of blood in every state, both recent and dried upon linen, wood, &c., with garden-earth soaked in blood, &c., has taught us, as well as other experienced microscopists, that such experiments are, alas! frequently unsuccessful. Hence it follows that the obtaining of such crystals is a certain proof of the presence of blood in the object examined, but that a *negative* result is by no means a proof that there has been no blood upon the stuff examined.

Case LXXVII.—Investigation of a piece of brown cloth apparently stained with Blood.

A foreign tribunal sent me a piece of brown cloth from the clothing of a person accused of having inflicted severe corporal injury, with the request that I would endeavour to ascertain whether the red stains upon it were caused by blood, or by some other substance; and, if by the former, how long these blood-stains had probably been upon the cloth? After several famous experts here had declined to co-operate with me on account of the difficulties inherent in the matter, I obtained the assistance of our sworn expert, Apothecary Schacht, and as the result of our conjoint labours we drew up the following report:—"The investigation of blood-stains upon uncoloured linen or woollen stuffs, and their diagnosis from other red stains present no peculiar difficulties; but it is far otherwise when such stains are found upon coloured woollen stuffs, as in the present case. We considered it judicious, in the first place, before proceeding to the investigation proper, to make the following experiment: we made use of a piece of brown woollen cloth upon which two drops of blood were allowed to dry completely; we then suspended the bit of cloth in a little distilled water, so that its lower edge was about three-quarters of an inch from the bottom of the glass tube in which the experiment was made; in a few minutes the hæmatin had already commenced to descend in stripes to the bottom of the tube and there accumulated, the rest of the water being only stained

of a yellowish hue; in a few hours the piece of cloth was removed and dried, and upon it there *was no longer any trace of the stains of blood to be found.* The fluid was then shaken up and assumed a uniform brownish-red colour, and the soluble constituents of the blood were readily recognised by means of the usual reagents, nitric acid, chlorine water, aqua potassa, and tincture of galls. We now examined the piece of cloth sent us, by means of a microscope, but without discovering any red colouring-matter upon the cloth, the fibres of which seemed rather to be individually stained. We now suspended the pieces marked 1 and 3 in water in the way just mentioned, but even after three times twenty-four hours, there was not the smallest trace of colour apparent in the water, and all the reagents produced no effect. The pieces of cloth were taken out of the water and dried; the red stains upon them remained unchanged. We have enclosed the pieces of cloth marked with their distinctive numerals. From the strip of cloth marked No. 2, we scratched off the stained part, to which we added a little water, this did not become coloured in the slightest degree, and the reagents employed produced not the slightest effect. We therefore feel justified in giving it as our opinion, that the red stains upon the pieces of cloth sent us *were most probably not caused by blood.*"

Case LXXVIII.—Spots of blood or tar upon a smockfrock.

From the Grand Duchy of Posen I received a blue smockfrock upon which there were some suspicious-looking stains, which, in their dark-red colour, the rigidity which they produced in the stuff, and particularly in the distinct appearance of besprinkling which existed in several parts, very much resembled the appearance of old stains of blood, whilst the accused declared that they were spots of tar. A microscopical examination, with a power of 500, proved the total absence of any blood corpuscles; even in the case of those stains which presented no particular appearance of having been rubbed or washed. After this investigation had afforded no confirmation of the supposition that these stains were stains of blood, threads from the stained parts of the cloth were burned, when they evolved a smell likened by all the bystanders to that of burning resin, as pitch or sealing-wax, which was of course in favour of the stains being spots of tar. The further chemical investigation was now carried out in conjunction with the chemical expert already mentioned. For this end several of

the deepest-coloured parts of the arms were cut out. One part was suspended in a small quantity of distilled water in a conical glass, so that it did not touch either the bottom or the sides of the glass. After standing two days, there were no stripes of colouring-matter (of blood) seen sinking from the rag, the water was not coloured in the very least, and neither the quantity nor quality of the colouring-matter upon the cloth was in any way changed. Another part of the cloth was heated in a dry glass tube, the vapour arising from it had an *acid* reaction, and *was not ammoniacal.* For the sake of a counterproof, we made use of a piece of cotton cloth with two drops of blood upon it; we dried this cloth, and cutting it in two, tested these pieces in the manner just described. From that portion suspended in fluid, the colouring-matter of the blood was dissolved with the accompanying phenomena peculiar to it, and the nature of the solution could then be proved by the application of the proper tests. From that part submitted to the second test, the usual ammoniacal fumes arose, which are significant of nitrogenous animal products. The stains, therefore, which had been sent us for examination *were not stains of blood.* In order to discover their true nature, that portion formerly soaked in water along with a fresh piece was macerated in pure alcohol. The stains became paler and paler, but did not perfectly vanish, and the spirituous solution left behind it, on evaporation, a *resinous* substance. The same pieces of cloth were then treated with rectified oil of turpentine, the stains completely disappeared, and a greyish-black powder was immediately precipitated, which, when heated on a platina plate, and the residue tested with acids, &c., was found to be a mixture of charcoal, clay, and oxide of iron. The results of these various experiments, therefore, made it clear that the stains in question were not blood, but, that they most probably arose from tar, or some such inflammable resinous substance.*

§ 44. Investigation of Stains of Ordure.

The intestinal evacuations of adults, and the meconium of newborn infants are readily recognised, both microscopically and chemically.† The medical jurist will, however, but seldom have occasion

* Both of these cases occurred previous to the discovery of the crystals of Hæmin.

† *Vid.* Lassaigne, *op. cit.* s. 125, &c. Robin and Tardieu, in the Annales d'Hygiène, 1857, s. 374.

to undertake any such investigation, at least, I have never had a single case of this kind during all my long and extensive experience, and the literature of the subject contains the records of only a very few such cases. And this is easily explicable, for stains of ordure are, as everyone knows, so very obvious to the senses, and so little apt to be confounded with stains originating from any other cause, that the Judge, even should he have any interest in their diagnosis, which but seldom happens, will be justified in drawing his own conclusions from a simple inspection without consulting the physician at all. For example, in a horrible case which occurred in my practice some years ago, in which a young woman was violated by four men, one of whom finished by going to stool in the room, dipping a venesection bandage in the filth, and stuffing it into the mouth of the girl as she lay there half unconscious, I had indeed to determine the fact of the rape on the body of the girl, but I never even saw the bandage, much less investigated the stains upon it, which, would moreover have been quite superfluous.

§ 45. Investigation of Stains of Semen.

Although I—as well as every other medical jurist—have often had to investigate stains upon the body, or bed-linen of living persons, for the purpose of deciding whether the suspicious-looking stains upon them were caused by the seminal fluid or not; yet I have never in one single case had such a query brought before me in relation to the linen of a dead person; and I may also add here, as in the previous section, that the entire literature of the subject comprises but a few isolated cases. I have, indeed, in two cases of rape, with subsequent death, had to decide respecting the violation, but in neither of these cases was it necessary to investigate the linen for spermatic stains. In similar cases, however, such a necessity might occur, and therefore the subject is here set down. I have already in another place* fully explained how perfectly untrustworthy is every analysis of a suspected seminal stain by the unaided senses, viz., by the eye and (by rubbing) by the smell. The shirts handed to the medical jurist for examination are not the fine, often changed, and therefore, clean and white shirts of the higher classes, nor yet the always clean shirts of the middle classes; but they are shirts long worn, coarse, and dirty, more or less torn, stained with a sickening

* On Rape and Sodomy. Casper's Vierteljahrschrift, I. s. 21, &c.

mixture of ordure, urine, mucus, menstrual blood, and that from bug and flea-bites, as well as dirt of every kind; so that the detection of one or of several distinct stains by the senses alone is extremely deceptive, and not seldom perfectly impossible. The chemical tests proposed by Orfila and others are also perfectly untrustworthy and far too diffuse; on the contrary, Lassaigne's method* is certainly somewhat recommended by its simplicity, and has proved successful in our hands. Suspicious spots upon white linen, not upon wool (which usually contains sulphur), are moistened with a few drops of *plombate de potass* (a solution of oxide of lead in aqua potassa) and dried at a temperature of + 20° C. (68° F.). In a few minutes the stain assumes a dirty-yellow or even a sulphur-yellow hue, when it has been produced by any albuminous compound (therefore containing sulphur); but seminal stains, and every other kind of stain not arising from an albuminous compound, as gum, amidine, dextrine, &c., are not altered in colour by this test. The yellow coloration of a stain thus treated, therefore, proves that it *is not* a seminal stain, but the reverse does not prove the contrary, and the most important and indispensable means of confirming the diagnosis is, therefore, the judicious employment of the microscope. It is, however, very improper to take the piece of linen cut out and to press or rub it strongly, as the whole process may be thereby rendered useless by the destruction of the spermatozoa. From much personal experience I can recommend the method proposed by Koblank† as at once the best and simplest. A piece of the linen containing the suspected spot is cut out and placed in a porcelain saucer containing a few drops of cold distilled water, the linen is then to be thoroughly moistened by gentle and careful pressure and moving about with a glass rod, after a quarter of an hour a single drop of the water is to be gently squeezed by the finger from the linen upon a clean glass slide, and should the stain have been truly seminal, the zoosperms will be at once readily recognised on bringing the slide under the microscope. Inexperienced persons may no doubt be deceived by the presence of epithelial cells, the fibres of the linen, &c., but whoever has only once seen a single characteristic spermatozoon, dead or alive, can never be deceived again. I have recognised them even after the lapse of an entire year, and thereby

* Annales d'Hygiène publ. 1858, X. s. 406.

† On the Diagnosis of Seminal Stains. Casper's Vierteljschft. iii. s. 140.

determined the existence of a seminal stain. Bayard* states that he has recognised them after three years, and Ritter† even after four years, which is perfectly credible, presupposing always that the linen during that long time has not been much rubbed or handled, because the forms of the zoosperms will be thereby destroyed. After a considerable time, indeed, they fall to pieces of themselves, and then nothing is commoner than to find only mutilated specimens, heads and filaments separate, but one single perfect zoosperm gives complete certainty as to the actual presence of a seminal stain. If the careful examination of an experienced eye has failed in detecting a single animalcule, after repeated examination, the medical jurist must declare that whatever may be the probabilities, no evidence exists to prove that the stain examined has been caused by semen.‡

§ 46. Investigation of Stains of Sulphuric Acid on stuffs.

We have particularly mentioned sulphuric acid because it is the poison made use of in an overwhelming majority of the cases of suicide, and of the murder of new-born infants and young children by their unnatural mothers (occurring in Prussia). A complete host of cases of the latter kind have come under my observation. Under this head we must also reckon those cases in which the attempt has failed, and those in which the child having only swallowed a few drops, has vomited, and obtained speedy medical aid from absorbents, &c., and either recovered or died after the lapse of a long time; cases in which perpetrator stoutly denies her guilt, and in which the only evidence against her is stains or holes in the child's clothing. For in such cases as prove fatal only after a protracted illness, the autopsy itself, inclusive of the chemical analysis of the contents of the body, may fail in affording any evidence of the poisoning (*Vid.* § 34. Special Division). Should the stains or holes really arise from the action of sulphuric acid, this is in general very readily determined. The stained or corroded spots are cut out and digested in cold distilled water, we thus obtain a fluid whose reaction is strongly acid, and by adding to it a solution of nitrate of baryta or of acetate of lead, we obtain in either case white precipitate insoluble in nitric

* Annales d'Hygiène publique, 1839, Juli.

† *Op. cit.* p. 224.

‡ The subject will be further illustrated in the Biological Part, § 16.

acid. If we add but a few drops of the acid solution thus obtained to a dilute solution of sugar and evaporate the mixture in the water-bath to dryness, a coal-black residuum results; these tests, therefore, as simple as they are inexpensive, afford perfectly certain proof of the presence of sulphuric acid.

CHAPTER IV.

INTERNAL INSPECTION.—(DISSECTION.)

STATUTORY DEFINITIONS.

(*Vid.* §§ 159, 163, 164, 165, 166, *and* 167 *of the Code of Criminal Procedure, and the "Regulations" already given at p.* 83, *&c.*)

§ 47. PRACTICAL PART OF THE DISSECTION (*a*). CRANIAL CAVITY.

WHEN both the front and the back and every individual part of the body has been carefully examined with due regard to those points we have already considered, we proceed to dissect it. Proper illumination is a most important requirement in this matter, artificial light being a most unsatisfactory substitute for daylight, because many things that we look for can only be recognised by their colour, which is often materially altered in appearance by the nature of the light it is viewed in. Nevertheless, in cases of necessity, artificial light is always to be preferred to an insufficient amount of daylight. In every case that cavity is to be first opened in which there is the greatest probability of finding the cause of death, whether that probability arise from any evident injury, or from general causes alone, as for example, we must first open the chest in those supposed to be suffocated, and the belly in those supposed to be poisoned, &c. In the case of new-born children alone we must make this difference, that in every such case the abdomen must be first opened in order that the natural position of the diaphragm may be observed undisturbed. In all other cases it is better to commence with opening the cranial cavity, were it for no other reason than merely to postpone till nearer the end of the examination those evil smells to which the opening of the other cavities generally give rise. In § 12 of the "Regulations" the best method of opening the cranial cavity is described, and to this description I now refer, only remarking that injuries, and even comminuted fractures of the skull, should make no alteration in this method, as the internal operation and relation

of such injuries are best observed by opening the skull in the ordinary manner by a circular cut of the saw. In two very horrible cases of robbery and murder, the public prosecutor, who was present at the dissection, was seized with the happy idea of ordering us to prepare and preserve the comminuted skulls of the murdered men, so that the injuries might be subsequently brought bodily before the eyes of the jury, and a verdict of guilty made all the more certain. The skulls were macerated, bleached and dried in the usual manner, and placed at the time of the trial on the table along with the other *corpora delicti*. The injuries done to them were pointed out to the jury, and this procedure (most worthy of imitation!) did not fail in producing a proper effect upon their minds. In examining the skulls of new-born children, no circular cut is generally necessary, as in such cases the blade of a pair of scissors may be passed through the sutures not yet closed, without injury either to the brain or its membranes—these may then be easily divided and the bones pressed aside. In examining the base of the skull for any injuries that may exist, we must not omit to remove the periosteum, as otherwise small fissures may easily escape observation. An exact anatomical dissection of the brain is never requisite, and we must never forget the specific (judicial) purpose of the dissection, in relation to which bodies, such as the pineal gland, the olivary bodies, &c., are of no consequence whatever. As the regulations prescribe, it is quite sufficient to lay open and inspect both the cerebrum and the cerebellum, the ventricles, particularly the lateral ventricles, with their choroid plexuses, the *pons Varolii* and the *medulla oblongata*, all the sinuses and the whole of the bones of the skull.

§ 48. Continuation.—(*b*) Neck and Thorax.

§ 13 of the Regulations prescribes that the examination of the chest is to be preceded by that of the neck, in which the larynx, the trachea, the œsophagus, the large blood-vessels and the cervical vertebræ are the chief parts to be examined. In such cases, as it may appear necessary,—*e. g.*, in cases of presumed suffocation by some foreign body, or of probable poisoning by corrosive poisons, the fauces, the cavity of the mouth, and the tongue should now be carefully examined. The method of opening the thorax prescribed in the regulations is the simplest and most convenient (*Vid.* p. 90). I subjoin a method of procedure which I have for a long time employed,

and cannot sufficiently commend in cases of supposed death from suffocation. It often happens, for instance, that in cases in which we should from other circumstances expect to find watery or bloody mucus mixed with air in the trachea, we find nothing at all, but the tube quite empty. In such cases, then, I recommend pressure to be made, carefully but somewhat forcibly, upon the upper part of both lungs lying as yet untouched in the opened thorax, *and very frequently we thereby succeed in forcing frothy or bloody mucus out of the bronchi into the trachea,* and so enrich the results of the post-mortem examination with this most important symptom. This method of proceeding, as also the following method recommended by me for the purpose of determining the amount of blood contained in the heart, form now a part of the New "Regulations." It is perfectly impossible to determine exactly the amount of blood contained in the heart on the one hand, or in the lungs and large blood-vessels on the other, without the use of such ligatures as are customarily employed previous to the application of the hydrostatic test in new-born children, because—especially where the blood is peculiarly fluid, as it usually is in those cases in which it is of most importance to determine the respective amount of blood contained in these organs, viz., in cases of suffocation—every cut into one of these organs permits the escape of blood out of the others. In order to prevent this, it is indispensably necessary in such cases to *examine the heart first,* and in doing so to *leave it lying* in its natural horizontal position and to open it by making a lateral longitudinal incision on both sides, thereby obtaining a distinct idea of the actual amount of blood in all the cardiac cavities; the lungs are next to be cut into, and the large blood-vessels opened last of all; and by proceeding thus we shall best obviate the difficulty described, where we do not wish to apply ligatures. In the case of wounds that apparently penetrate the thorax, the wound itself must of course be examined as far as possible first of all, and before any of the organs are disturbed, because the manipulation of the organs, and the tearing and opening up of the thorax may very readily produce important alterations in the form and size of the injury.

§ 49. Continuation.—(*c*.) Abdominal Cavity.

I have nothing of consequence to add to §§ 14 and 15 of the regulations which relate to the examination of this cavity. The order

of succession in which the abdominal organs are to be examined, arises naturally from their individual position. When putrefaction is already considerably advanced, it is advisable to commence with the stomach, lest otherwise, during the manipulation of other organs it rupture, and its contents escape; and in making this statement, of course, I do not refer to any case of known or suspected poisoning, because in these cases the procedure described in § 15 of the regulations must never be omitted (*Vid.* p. 91). After the stomach, the liver and omenta are to be examined, and then the other abdominal organs in their order. In regard to the amount of blood in the venous trunks, it is sufficient to examine only the main trunk, the *vena cava ascendens*. Should it be more than usually important, as in cases of suffocation, apoplexy, &c., to determine the amount of blood contained in this vessel, the shoulders of the corpse are to be somewhat elevated from the commencement, so as to prevent as far as possible the escape or loss of any blood from the *vena cava*, should the thorax and its vessels have been, as usual, first laid open. In such cases, also, the vessel should not be opened, as it generally is after the examination of the other organs, but first of all, so that its contents may undergo as little change as possible. The regulations not only require that the presence of any effusion into the cavities of the thorax or abdomen should be carefully noted and examined, but the necessity for this is self-evident. In the abdomen, where such effusions are often found in very considerable quantity, it is most convenient to ladle them out at once, on opening the cavity, into any empty vessel, by means of a measuring-glass. The weight of the effusion may be easily deduced from the contents of the measuring-glass with quite sufficient accuracy for such cases. It is only necessary to weigh such trifling effusions as cannot easily be measured. The spinal canal is not usually opened, and it is only necessary to do so in those cases in which something is expected to be found in it, having an important bearing on the determination of the case.

CHAPTER V.

MINUTE OF THE EXAMINATION OF THE BODY (OBDUCTIONS PROTOKOL).

Statutory Definitions.

(*Vid.* § 168 *of the Code of Criminal Procedure* (p. 85), *and* §§ 19-21 *inclusive of the Regulations annexed* (pp. 92-93).

§ 50. Form and Contents.

We have so often experienced the difficulty that neophytes in judicial medicine find in understanding the difference between these perfectly distinct documents, the *minute* of the examination (obductions-protokol), and the *report* of the same (obductions-bericht), that we hold it to be perfectly necessary to describe their nature somewhat in detail.* The *minute* of the examination is the work of the presiding legal official, the *report* of the examination, that of the medical inspectors. The *minute* of the examination is written at the time of dissection and during its progress, the *report* of the examination is written by the physician in his study, often months after the dissection. In the *minute* of the examination, circumstances are often included which have no connection with the scientific examination of the object in question (the corpse), *e. g.*, the recognition of the body; the examination of those witnesses that have found the body; the behaviour of the suspected murderer when first confronted with the corpse; the orders for the burial of the body given at the close of the document, and many other circumstances of a similar nature. The *report* of the examination is, on the contrary, a purely scientific treatise upon the question at issue, the materials for which have been furnished by the results of the examination. In one word, the

* In particular, it is one of the most common mistakes in the written examinations of the candidates for the office of (district) physician, who are all, without exception, required to draw up "a report of a medico-legal examination according to the form prescribed," that they confound and mix up minute and report with each other, &c., and thereby draw down upon themselves the censure of the examiners (the Royal Scientific Commission).

minute of the examination, like every other judicial protocol, is a mere "memorandum," in which is registered every occurrence at the time appointed for the examination by the judicature, and which, of course, also includes the report of the dissection; and thence it arises, that circumstances wholly unconnected with the object of the judicial physician, as the evidence of witnesses, &c., are always given at the commencement more or less in detail, and form as it were the introduction to the minute (of the dissection); and only after the presiding legal official has furnished these preliminaries does he call upon the medical inspectors to proceed with their part of the work, and to dictate the results. The mode in which this is to be done is sufficiently accurately described in the (§§) sections of the Regulation we have already quoted. Now, however, I would again (*Vid.* § 23, page 56) most earnestly warn against the insertion into the minute of any matter not pertinent to the subject, such as want of knowledge, inexperience, over-anxiety, pedantry, and misapprehension of the object of the entire official proceeding, only too often introduce. We must always and without any exception ever remember,* that the dissection of the body is a judicial one, *i.e.*, undertaken for certain judicial objects. Whatever, therefore, has no relation with these, even pathological products, if unconnected with the judicial object in question, must be, if not entirely omitted, at least only enumerated summarily. Where, for instance, a man has died from being shot through his liver, or stabbed in the aorta, it is not necessary to describe with pathologico-anatomical exactness a tubercular condition of his lungs, or a cirrhosis of his liver, or such like, which may possibly be present, but which, whether present or not, can have no influence in the matter viewed from a judicial point of view. The simple statement:—"The lungs were strewn with tubercular masses," &c., will be perfectly sufficient in such a case. The same remark holds good in respect to rare pathological-anatomical conditions, as the anormal position of internal organs or vessels, their complete absence, rare forms of tumours, &c., provided these conditions have no connection either with the death of the deceased or the judicial object of the dissection. The medical jurist may preserve for his own private use, the most accurate descriptions and drawings of any such object of interest; but only a summary notice at the most, and never any accurate description, is allowable within the

* Even in the Examination Papers in which these rules are so often sinned against!

judicial minute of the dissection. Such an accurate pathological description is only then permissible, or rather requisite, when the judicial object of any dissection is to obtain matter whereon to ground an indictment for unscientific medical treatment; in such a case the stage of the tuberculosis, or the discovery of a tumour whose diagnosis during life, must have been invested with difficulty, may be of the utmost importance, and their accurate description in the protocol is therefore necessary. But such cases are extremely rare. Another species of what the regulations call undue "prolixity of detail," is apt to arise from embarrassed and inexperienced medical inspectors dictating for insertion in the protocol too minute a description of the body, embracing things that have not the most remote connection with the matter in hand. In Prussia the regulations most judiciously no longer require, in the case of known bodies, any description of the length of the body, the colour of the hair or the eyes, or the estimation of the age; and it is far more irrelevant, particularly for medical inspectors, to enter upon such matters as the form and size of the whiskers, the shape of the nose, the length of the *penis*, &c. Amid the waste of numerical paragraphs in the protocol of such an examination, the actual results are wholly lost. Experience teaches us, that in general every point of any judicial importance may be fully and efficiently comprised under from thirty to forty numerals, or in the case of new-born children some fifty may be required, in order to embrace fully and comprehensively all those points having relation to the hydrostatic test. Where many external injuries exist, which must be separately described, as many as seventy or eighty numerals may indeed be required, but protocols containing a hundred and more numerical paragraphs, in all but the rarest cases betray by that very circumstance their inaccuracy, because, they thereby demonstrate that the medical inspectors must either have transgressed the rules we have just laid down, or improperly divided things naturally connected, such as enumerating under six or eight different numerals the results of the dissection of one healthy and uninjured organ. I have still one other frequent blunder to refer to. The protocol of the dissection is intended to *describe* the actual results of the medico-legal dissection, to supply as it were a picture in words of these results to the legal documents. A description, however, involves no *opinion*, and the protocol of the inspection ought not, therefore, to contain any opinion. Very frequently, however, the medical jurists make use of such expressions as imply not a descrip-

tion merely, but also an opinion, particularly in the case of existing inflammations and their results. For instance, instead of dictating that the peritoneum is of a cinnabar-red, and its finer vessels injected, they dictate "the peritoneum appears to be *inflamed*." Such an expression is all the more improper, that it precludes any control from the other medical courts, inasmuch as they do not, and cannot know what the inspectors have really *seen*, and upon what they have founded their opinion, or conclusion as to the existence of "inflammation." Might not, for example, the phenomena observed have been those of internal hypostasis? or of putrefaction? It is worse still when the inspectors, instead of giving a description of what they have seen, dictate perfectly general opinions in their protocol: the clerk may, for instance, have written most impartially to the dictation of the physician:—"(8.) Round the neck there was the mark of a cord, which had quite the appearance usually found in those who have been hanged." Such an *opinion*, with complete omission of every *description* of what was found, must be at once seen to be perfectly worthless by every one who reflects on the matter at all.

§ 51. Continuation.—The Summary Opinion.

When the examination of the body is over, its dissection concluded, and there remains nothing more to register under that head, the medical jurists have at the end of the technical part of the protocol to dictate their provisional or summary opinion; that is, to state shortly, and without any scientific reasoning, their opinion as to the results of the dissection, as it were in answer to the question, "What is the present state of the case in the eye of the law?" This preliminary opinion is intended to guide the Judge in the proper direction, and give him a clue in further conducting the preliminary investigations. Frequently this opinion alone will suffice to quash the case, as, for instance, when the suspicions at first entertained, that the deceased had died a violent death, are set at rest by the results of the dissection, while, on the contrary, the law is often stirred up to a more energetic following out of the matter. The provisional opinion, therefore, as well as every other medico-legal decision, must be given as decidedly as possible, because any doubtful or hesitating statement must naturally prove unsatisfactory to the Judge. I say, as decidedly as possible, because cases not unfrequently occur in which it is impossible to give a perfectly decided

opinion, particularly at that early stage of the proceedings at which the dissection usually takes place, where, in most cases, many facts having an explanatory bearing on the case have not yet been brought forward. If, however, the objects of the medico-legal examination be only kept constantly in view, as they have been described in the first three chapters of the first part of this book, a perfectly unsatisfactory decision is not very likely to be the result. Of these objects the determination of the cause of death (§ 23 and § 24) is the most common, and is always the most important; therefore, the summary opinion must commence first of all by stating in what manner the deceased has met his death, excepting only in the case of the bodies of new-born children, in which the questions respecting the uterine age of the child and its live birth must first be disposed of. Inexperienced persons are now apt to be plunged at once into a dilemma, inasmuch, as in not a few cases the special cause of death is not discoverable by dissection. Slow fever, most chronic diseases, convulsive diseases, &c., leave behind them no traces in the body, whereby their pre-existence may be diagnosed. In such a case, how can the medical jurist determine the cause of death? In the simplest manner, I repeat (*Vid.* § 23), if he will only continually remember the judicial object of his task: viz., by stating in the summary opinion respecting every such case, "that the dissection has brought to light no trace of a violent death, and that the deceased must be assumed to have died from internal disease;" the object of the investigation is thereby fully realized, and the Judge satisfied, because he being only interested in death from violence, is perfectly indifferent whether death has arisen from fever, convulsions, or old age, &c., provided only it has been from natural causes. Should, however, the medical inspectors have reason to regard the death as having been produced by violence, they must in their provisional opinion summarily describe the nature of that violence *e. g.*, the death was caused by asphyxia, which was produced by strangulation. It is not always possible to give such a decided opinion from the results of the dissection alone, and this must then be stated as more or less probable, reserving a more decided opinion till more correctly informed as to the nature of the case, by chemical analysis of the contents of the intestines, by examination of the mother of the new-born child dissected, or by inspection of the documentary evidence, &c. In general it is better for the medical jurist in his summary opinion, to content himself with giving his views on the two points we have referred to, and to await farther

inquiries on the part of the legal official present. This procedure is much more prudent than the opposite one of bringing forward a multitude of questions which have either no interest at all for the Judge, and are consequently irrelevant, or which only unnecessarily complicate the matter. If the Judge be not sufficiently enlightened, he will never fail to ask special queries of the medical inspectors, supplementary of their summary opinion; and we have often had six, eight, or more of such queries to answer in important cases. The next question in cases of fatal injury is one which the Judge is bound by law to ask (Criminal Code, § 162, p. 84), and respects the weapon with which the injury has certainly or probably been inflicted. This question we have already considered in §§ 34-41. But, according to the manifold complications of the cases which occur, a hundred separate questions may arise which the medical inspectors are expected to answer. Such questions respect the position of the deceased at the time he received the injury; the position of the culprit at the time of its infliction; the probable time of death; the question whether the case is one of murder or suicide; whether one or more have laid hands on the deceased, &c., numerous examples of which are detailed in the cases related in § 41. It happens very often in such cases, that an answer can only be given with more or less probability, and in many such cases it is advisable to give the medico-legal answer a negative form, since this is not only founded in truth and in accordance with science, but also leaves unfettered the further medical investigation of the case, I mean an answer, such as this for example—"that the dissection has not supplied any facts which exclude the supposition that, &c." In other cases, and where such an answer is not possible, we must not hesitate to declare our incompetence, and reply, that the dissection has not afforded any information on the point in question, or that it could not have given any. Such a procedure is every way more conscientious, more honourable, and more prudent, than a reckless answer, which will by-and-by be found to be devoid of any foundation in science or experience.

In not a few obscure and difficult cases an absolute declaration of incompetence may still be averted, by the medical inspectors requesting from the presiding legal official all those particulars of the case, which, even at that early stage of the proceedings, he may be in a position to give. § 7 of the New "Regulations" empower the Prussian medical jurist to make this reasonable request, while the

Austrian regulations expressly enjoin the medical inspectors to make it, and no Judge will refuse to communicate all that is known to him; for example, regarding the place the body was found, the time when this took place, the condition of the clothing, the statements of those few witnesses who may have been already examined, &c.; and this information may often be sufficient to decide the medical jurists in forming their opinion of the case. For, it is not the intention of this important proceeding to propound riddles to the medical men, the solutions of which the Judge already possesses, but both have the same interest in clearing up an obscure or still imperfectly explained case, and the time when medical men were strictly confined to the results of the dissection, which, as we have said, are often enough negative, and prohibited from making use of information obtained beyond the cognizance of their own peculiar sphere, lest they should suffer themselves to be misled, lies far behind the present position of medical jurisprudence and of legislation. In regard to this subject we must not forget, that now most cases of medico-legal autopsies, after the preliminary investigations are concluded, come to a public and oral trial, during which the medical inspectors may hear the whole matter gradually unfolded. The summary opinion is in every case only a provisional one, and in subsequently giving their reasoned opinion (§ 53), the medical inspectors are not to be bound by it. But deviations and contradictions between these are for obvious reasons as far as possible to be avoided; and, in regard to this, I will still point out two circumstances which may readily lead to a hasty decision at the time of the autopsy, which must be retracted in subsequent opinions when more accurate information has been obtained. Subordinate police officials, &c., who have assisted at the removal of the body, are frequently present as witnesses at the time of the autopsy, and give their view of the case. Experience teaches that such individuals are generally full of prejudice in their statements and views, they say they have seen stains, marks of strangulation, blood, wounds, &c., which are not to be found on the body; they have seen the new-born child moving convulsively, &c. Such evidence must be received by the medical men with the utmost caution, it rests upon erroneous observation and preconceived opinions. In other cases, the statements of the accused, present at the autopsy to identify the body, occasion the experts to give an erroneous opinion. Once for all, I would most urgently advise medical jurists always, and not only at the dissecting-table, to use the statements of the accused with the

utmost caution in giving their opinion, and never to base it exclusively on them. The accused, as daily happens in important cases, varies his confession many ways in the course of the investigation; he retracts everything he has already confessed, and the medical opinion based upon it falls with the retractation!

After the reception of the summary (or provisional) opinion, at the close of the record of the results of the dissection, the legal official present causes the minute of the proceedings to be signed by both the medical inspectors, he then closes the minute (of the inspection) in the manner customary in all legal proceedings, and carries it off to be added to the other documentary evidence.

Case LXXIX.—Death from Drowning.

In consequence of the frequent confounding together of the *minute* of the examination with the *report* of the examination, which, as we have already said, is of daily occurrence, it seems not injudicious to give here as a sample the following complete *minute of the examination* of a case of death from drowning, which is also interesting for its own sake. In the next chapter we shall give the *report* of the examination of the same case (p. 231), so that the most inexperienced may at once clearly perceive the difference between the form and contents of the two documents. The minute of the examination of the case noted down at the time runs as follows:—

Transacted at Charlottenburg, 26th March, 1852.

In the matter respecting the determination of the manner whereby the male body found at the back of the Deppe property came by its death; the following (medical men) having been duly summoned, appeared for the purpose of conducting the medico-legal examination in the Hospital here:—

(1.) Dr. Casper, &c., &c., &c.

(2.) The forensic surgeon, Herr Lütke.

And to them the body lying in the Hospital dead-house was given over for dissection, and both these gentlemen having given negative replies to the questions of general evidence, dictated the following minute as the result of the dissection.

A. External Inspection.

(1.) The body is five feet five inches in length, apparently about

forty years old, well-nourished; has an abundance of light-brown hair, the eyes are blue, and the tongue lies behind the teeth. The tongue is covered with mud, particularly towards its point.

(2.) Rigor mortis does not exist.

(3.) The colour of the body is the usual corpse colour, only the abdomen is green from putrefaction, and the whole countenance red from post-mortem staining, proved to be such by incisions.*

(4.) About the middle of the forehead there are two spots situate one above the other, of a reddish-brown colour inclining to yellow, hard to cut, roundish in form, and about three-quarters of an inch in diameter. Incision through these spots brought to light no extravasation of blood.

(5.) The ridge of the nose displayed the same condition already described under No. 4.

(6.) The posterior surface of the upper extremities, several parts of the face, also the back of the body, are soiled with mud.

(7.) The hands and feet are bluish, and both, but particularly the former, display longitudinal corrugations, especially on the fingers.

(8.) The skin on the inferior extremities, and on the right arm, displayed the condition termed *cutis anserina*.

(9.) No foreign bodies are found in the natural cavities, with the exception of some mud removed from the fauces.

(10.) At the external angle of the left eye, after removal of the mud, a dark bluish-red coloration of the upper and under eyelids became visible, which when incised, betrayed a trifling extravasation.

(11.) The neck and sexual parts are natural, and there appears nothing else to remark on the external surface of the body.

B. Internal Inspection.

1. *Opening of the Cranial Cavity.*

(12.) The soft parts covering the cranium display nothing unusual. The skull-bones are uninjured, and are of the unusual thickness of three lines.

(13.) The vascular meninges display a visible, but not extraordinary degree of congestion.

(14.) The brain is firm but not much congested.

* The deceased was found dead, lying on his face, and with it half immersed in a shallow, muddy puddle close to the bank.

(15.) The lateral ventricles are tolerably well filled with serum, the choroid plexuses tolerably congested.

(16.) The cerebellum is quite normal.

(17.) This is also the case with the pons Varolii and the medulla oblongata.

(18.) All the sinuses are much congested.

(19.) The *basis cranii* is uninjured, and there is nothing else to remark in regard to the cranial cavity.

II. *Opening of the Thorax.*

(20.) All the organs are in their natural position. The right lung is partially connected to the ribs by means of old adhesions; both lungs are darker in colour than usual, completely filling the thoracic cavity and are very full of blood, without being excessively so. There is no water in the lungs.

(21.) The large blood-vessels are also not unusually congested.

(22.) In the pericardium there is the usual quantity of fluid. The coronary vessels of the heart are very strongly congested, and the right side of that organ is turgid with dark and perfectly fluid blood, while the left is empty.

(23.) The trachea and larynx are empty and in no respect anormal; muddy mucus flows downwards from above during the examination.

(24.) The œsophagus is empty.

(25.) In the left pleural cavity there are about three ounces of bloody fluid.

III. *Opening of the Abdominal Cavity.*

(26.) All the organs occupy their natural positions. The stomach is full of a greenish-yellow watery fluid, in which the remains of food and some mud can be recognised, in other respects it is normal.

(27.) The pancreas is normal.

(28.) The liver is strongly congested with dark fluid blood, the gall-bladder is full.

(29.) There is nothing remarkable about the spleen.

(30.) The mesenteries and omenta are very fat.

(31.) The kidneys are much congested.

(32.) In regard to the intestines, we have only to remark, that the large one is full of fæcal matter.

(33.) The urinary bladder is empty.

(34.) The *vena cava ascendens* is tolerably distended, with dark fluid blood.

At the close of the dissection, the medical inspectors gave it as their opinion:—

(1.) That the deceased had died from apoplexy of the heart and lungs.

(2.) That death had occurred in a muddy fluid.

(3.) That the deceased must, therefore, have been alive when he fell into the water.

(4.) In answer to a question: the ecchymosis of the left eye described under No. 10, is not to be regarded as a cause of death.

r. *a.* *s.* *

(Signed) Casper. (Signed) Lütke.

a. *u.* *s.* †

Jordan. Bidault.‡

* Read over—approved—signed. The German letters are *v. g. u.*:—Vorgelesen, genehmigt, unterschrieben.

† *Actum ut supra.*

‡ These are the signatures of the legal official present, and of the sworn clerk who drew up the minute.

CHAPTER VI.

THE REPORT OF THE EXAMINATION OF THE BODY (OBDUCTIONS BERICHT).

Statutory Definitions.

(*Vid. Code of Criminal Procedure*, §§ 169-171, *and* "*Regulations*," § 22, pp. 85-86 *and* 93.)

Code of Criminal Procedure, § 172. *When the contents of the report of the examination of the body differ materially from the contents of the minute of the same, the experts must be required by the Judge to explain, in writing or orally, the reasons for this difference.*

§ 173. *Should the difference or contradiction not be satisfactorily removed in this manner, the statements contained in the minute (protocol) of the examination are to be assumed as the most correct when the matter has reference to the statement of the facts. Should, however, the difference between the report and the minute have reference to any opinion founded upon these facts, and have an important bearing on the decision of the case, it must be referred to the medical college of the province for their advice.*

§ 174. *The advice of the college shall also be sought:*—(1.) *when the medical inspectors do not feel competent to deliver a decided opinion in the matter;* (2.) *when they do not agree in their opinion, and* (3.) *when in the report given in there are such obscurities and contradictions, as they find themselves incapable of satisfactorily removing, whereby there arises in the mind of the Judge a well-founded doubt as to the correctness of the opinion given.*

§ 175. *In such a case the Judge must lay before the medical college distinct questions to be answered, and to enable them to understand the whole matter, must therewith transmit to them all the documentary reports of the investigation.*

§ 176. *The medical college is enjoined to attend to such a requisition without loss of time, and to deliver an opinion supported by scientific reasons.*

§ 177. *In important cases it is open to the Judge for his own satisfaction to refer the matter to the Superior Medical College at Berlin;* for their opinion.*

Circular rescript of the minister for Ecclesiastical, Educational, and Medical Affairs, of 30th May, 1850:—

Complaint has been made by the courts of justice, that all district physicians are not equally prompt in giving in their reports, but that some are guilty of very serious procrastination, even in matters connected with imprisonment. To prevent similar complaints in future, I ordain that in matters connected with imprisonment, the report must be given in at the latest four weeks after the copy of the minute of the examination has been given out, where the court has not expressly fixed a shorter time. This is to be communicated to all district physicians for their observance. Where this time is not adhered to, the government, on the court bringing it before their notice, must, after ascertaining the circumstances, proceed energetically to put in execution the punishments ordained.

§ 52. Form and Contents.

The Report of the medico-legal examination (*visum repertum*) is, as we have already said, a purely scientific treatise upon the question at issue, for which the dissection has supplied the materials; a detailed and practical application of the laws of judicial medicine bearing upon the individual case in point. The Judge is thereby placed in a position to see the case clearly in all its bearings, and thence to gain a clue to guide his further interference in the matter. The expression—Treatise—is not intended to signify a voluminous extension of the report; the number of sheets never indicates the worth and ability of any composition, even of a medico-legal one. If the case be uncomplicated, a perfectly satisfactory report may be comprised in a few pages; and in truly complicated cases, by setting aside everything not properly belonging to it, it is easy to avoid sending in a complete volume to the court, which never receives one of that character with pleasure! Moreover, it is never requisite to give in a report of the inspection, unless the medical jurist (including both of the medical inspectors) has been specially requested to do so by the judicature concerned, which request is usually accompanied by the transmission of all the documentary

* At present the Royal Scientific Commission for Medical Affairs, forming part of the Ministry of Ecclesiastical, Educational, and Medical Affairs.

evidence pertaining to the case up to that time, or at least of a copy of the protocol of the inspection. But for this regulation many a perfectly useless composition would be produced, and the public funds burdened with the payment of unnecessary costs, since there are many cases in which the law officers, after examining the protocol of the inspection and the provisional opinion appended thereto, decline the further prosecution of the case, and repone the documents. Written reports are in other cases also, frequently not required now, because the judicature reserves to itself the right of taking the opinion of the medical inspectors *vivâ voce*, in the course of their oral examination upon the matters connected with the examination of the body.

The written report of the inspection, like every other report, has a certain formal mode of commencing; as it is nothing but a simple business report, it is perfectly sufficient to begin it thus:—"In the matter regarding N. N., at present under investigation, the subscribers, in conformity with a requisition, dated the —— inst., beg to forward the following report of the medico-legal examination." The ancient formula:—"Upon the requisition of the —— Court, dated ——, the subscribers proceeded on the —— to —— in order to make a medico-legal examination of the body of ——. They there met with the legal officials," &c., &c., is an obsolete, heavy, legal form, *perfectly superfluous and therefore to be set aside.**

Next there follows a historical relation of the facts of the case, embracing those points most important in a medical point of view (historical narrative, *species facti*), extracted from the documentary evidence, always provided, of course, that these documents have been communicated to the medical inspectors. It is never in any case incumbent on the medical jurist to supplement the documentary evidence by interrogating the accused himself, or any of the witnesses known to him, &c., unless he be in particular cases specially authorized by the Judge to do so, which can scarcely happen in any case of medico-legal inquiry involving a dissection—but may occur in inquiries respecting the condition of the mind; or in regard to women recently delivered, in cases of child-murder. On the other hand, the medical inspectors are permitted to direct the attention of the Judge to the absence of any necessary information from the precognitions up to that time, such as the want of a clinical report of the illness of

* This has been done in § 22 of the New Prussian Regulations since the above was written.

the deceased, &c., and it is the business of the Judge to supply this deficiency before the report is drawn up. The narrative must be as short and concise as possible, all the more so, that it is already well known to the Judge, and is only quoted by the medical inspectors because they may have occasion to refer to it in the course of delivering their opinion regarding the case.

Then follows the anatomical part of the report, in the composition of which the Regulations very properly direct that the protocol of the examination is to be followed, as far as possible, word for word; this of course refers only to that portion of its contents necessary for the elucidation of the case (not *in extenso*); and the numerals in the report must correspond with those in the protocol, any deviation from the latter being expressly pointed out. This correspondence is easily attained; since the medical inspectors receive a copy of their protocol, or may obtain it on request; there is no legal reason for refusing such a request, and the Judge will never decline to comply with it.

§ 53. Continuation.—The Written Reasoned Opinion.

The second and most important part of the report contains the *opinion* upon the case. It is presupposed that both the medical inspectors have come to an agreement respecting the contents of the report, wherefore it is written throughout in the plural, and the report is signed by both. Should they, however, not be agreed, the second medical inspector, the district surgeon, or his medical substitute, is not only not prevented from giving in his own report, but it is his duty to give in his own opinion regarding the case, separate from that of the physician. This opinion, in contradistinction to the provisional or summary opinion of the protocol, must have all its most important propositions and assertions supported by scientific reasons. Medical jurists who have not yet had opportunity to acquire the perfect confidence of their forum, will do well to support their assertions by quotations from known authorities. Scientific reasons must, however, never be confounded with scientific digressions. Theoretical discussions, or the statement of scientific hypotheses, &c., which so frequently occur in medico-legal reports are wholly improper, because they are confusing and unintelligible to the vulgar; the proper mean cannot, however, be taught here; the sound judgment of the author of the report must teach him the bounds within

which he must in this respect confine himself. The following hints, taken from my own long and considerable experience in the practice of judicial medicine, confirmed and corrected by two-and-thirty years' official inspection of innumerable medico-legal reports, coming before the higher medical boards, can be heartily recommended to all authors of such reports, as certain to secure for their labours the respect of both legal and medical boards.

In general, certain distinct questions from the Judge are given as the foundation of the medico-legal report. And it is most prudent to answer no more than is asked; for the physician must of course suppose that the Judge has exhausted the case in the questions he has put, and by further digression, the physician runs the risk of putting weapons into the hands either of the defence or of the public prosecutor, which are only too often directed against himself. It is different, however, in those cases in which no questions are asked, and in which a "medico-legal report" is simply demanded. In such cases it is competent for the judical physician to review such points as seem to him most important for the Judge in the actual circumstances of the case, and for this his own experience (however limited, and his (necessary) knowledge of the statutes concerned will enable him to select the data. For example, in the report of the dissection of new-born children, attention must be given to the questions regarding the maturity of the child, its live birth, the nature of the death and its cause, &c.; and in the case of many deaths the question of murder or suicide must be duly considered, &c. Amongst the questions put by the Judge to the physician some occasionally occur which it is absolutely impossible to answer; I have already, in §§ 35-38, given examples of such unanswerable questions in regard to weapons; in such cases, I repeat, one must never be afraid at once openly to acknowledge his incompetence. It is much more conscientious and honourable to do so, and to explain that neither general medical knowledge nor your own individual experience has any answer to give to the point at issue, than to give a perfectly general and more or less hesitating reply, whose untenableness will be, moreover, at once seen through.

Many cases occur in which, from the results of the dissection alone, no positive opinion can be given as to the nature of the death; such are, for example, many cases of drowning, of suspected poisoning, not a few cases of doubtful suicide, and many others. In such cases there may exist so many points favouring an affirmative answer

to the question propounded, that such could conscientiously be given, were there not others wanting which would be required to supplement the evidence, or were there not in truth others existing directly opposed to such an affirmative. In such cases, there are two ways of deciding the question, either an affirmative is wholly withheld, and it is assumed that there is a "probability," or a "great probability," or "a probability almost amounting to certainty," that what would under other circumstances have been distinctly affirmed has occurred, *e. g.*, that the deceased has been drowned. Or a negative opinion is given, it being stated that the dissection has revealed no results inconsistent with the opinion that so-and-so has happened, *e. g.*, poisoning, or suicide. I frequently employ this latter form in cases of this kind; it recommends itself by its being perfectly practical; by not burdening the conscience of the physician, since he can always justify whatever statements he makes in this manner, and it also in general suffices, as I can testify, both Judge and prosecutor, who can supplement the evidence thus declared defective, by other means which stand at their behest—such as the testimony of witnesses, &c.—and thus complete the proof. Moreover, when such cases are followed out and brought to trial, the medical inspectors then learn a number of facts, previously either unknown or seen in a different aspect, and which enable them to give a more positive form to their previous negative verdict, without contradicting its terms. To carry in doubtful cases your negative assertions any further than what we have just pointed out, is to yield to a spirit of undue scepticism fatal to the practical utility of legal medicine. Experience teaches us that judicial physicians, in delivering their opinions, only too often err through excessive scepticism, an error which cannot be too carefully avoided. Not only to the positive teaching of the schools, but also to a healthy mind, must be conceded the honour of being the source of successful and correct judgment, not only in ordinary medical, but also in medico-legal practice! Keeping to the instance of death by drowning, it is certainly true, that under many circumstances—by no means under all, as we shall show under §§ 53-55 of the Special Division—its occurrence is only substantiated with difficulty. In such a case, the physician, text-book in hand, is perfectly in the right when, in his opinion, he lays down the reasons why it cannot be proved that the man, whose body has been taken out of the water, has fallen alive into it and been drowned, but that this must remain undetermined. I will say nothing of the fact that such an opinion does not

aid the Judge, but leaves him helpless, since the physician need not trouble himself about the consequences of his views, provided always that these are in every respect tenable. But, is it justifiable to set forth such a *testimonium paupertatis* as that given by the judicial physician in thus wording his opinion, which is but another way of saying, "I do not know how this man came by his death." Is this declaration of incompetence warranted? Certainly not. In the first place, it has been ascertained that the body was taken out of the water; but thousands of living people fall into the water and are therein drowned, while in very rare cases only do bodies already dead find their way thither. There is, therefore, a great degree of probability that the deceased also fell into the water alive. Moreover, at the dissection, one, two, or three symptoms always found in indubitable cases of drowning were discovered, sundry other proofs of a death of this nature being no doubt wanting. Finally, there was nothing discovered that could justly lead to the supposition of death from any other cause than from drowning. If we put all these things together and add to them those innumerable accessory circumstances which are found in connection with every similar case, it seems certainly pushing matters a little too far to join with a recent, and otherwise excellent author, and votary of this undue scepticism (Engel), in saying—tell me how a man has died, and I will then explain his death from the results of the dissection! When, on the contrary, in similar doubtful cases, which often enough occur, we employ the following form in delivering our opinion—"That the dissection has not revealed anything inconsistent with the opinion that, *e. g.*, the deceased was alive when he fell into the water, and that he has met his death therein," I think we shall thereby satisfy at once the requirements of science as well as those of a sound understanding.

Cases, such as those we have just referred to, happen along with others extremely simple, and permitting of the readiest decision. But such extreme simplicity leads judicial physicians not infrequently into erroneous judgments. They seek, where there is nothing to be found, and suppose it is not possible at the conclusion of an official and judicial dissection—which is always invested with a certain amount of dignity—to state simply, *e. g.*, the man has died from apoplexy, from natural causes, nothing more and nothing less. And so they enter upon suppositions and arbitrary conjectures which lead them far astray, which confuse the Judge, and force him to solicit the opinion of the higher courts, which is often attended by

no other result than the restoring of the case to its primitive simplicity. Our superior scientific medical boards have this task too often to perform, for us to omit to warn against this fault in the construction of medico-legal reports; with such faults there is closely connected another—a true mania, possessed by some judicial physicians, fortunately not many, which cannot be too strongly condemned, I mean the passion for discovering a crime. A scratch, a yellowish-brown stain on the body, which they often do not suspect to have arisen after death; features in which their prejudiced eyes read only "anguish and despair;" a mark upon the neck, which the experienced practitioner ascribes to some simple cause, appears to such as the mark of a ligature, &c., and gives them occasion to write, not the report of a dissection merely, but—a veritable romance. In this they not only clearly make out from apparently scientific reasons the (non-existent) crime, but they also describe, often with considerable acuteness, and as exactly as if they had been eye-witnesses, all the particulars connected with it, and with the proceedings of the "murderer!" I have seen cases in which perfectly innocent persons were by such fantastic medico-legal reports consigned to imprisonment for months, and in which the severest reproofs of the superior medical boards could afford no sufficient equivalent for the injury done.

At the conclusion of the medico-legal report, the decisions come to in its course are recapitulated in a short *résumé*, which should give, in a concise and summary form, a full and complete view of the opinions of the medical inspectors respecting the case in hand.

Finally, at the end of the document an ancient formula used to be appended:—"In conclusion, we certify that we have drawn up the foregoing report according to the best of our knowledge, conscientiously, and in accordance with the principles of judicial medicine," &c. This lawyer-like appendix is to be set aside as a perfectly superfluous and self-evident confirmation of the report, and, like the obsolete introduction already referred to, has been wholly disregarded in the Berlin Courts by us and our predecessors in office for more than one generation. Such a certificatory appendix is, moreover, nowhere prescribed by the statutes. This obsolete superfluous formula, which the newest handbooks still teach, rests upon tradition alone, like so many other more important points in medical jurisprudence!* On the other hand, of course, the

* It is now set aside by the Prussian Regulations.

signature of both the medical inspectors and the impressions of their official seals must be appended to the report as the legally prescribed mode of attesting its authenticity.*

Report upon Case LXXIX. — Has the deceased fallen into the water alive?

As a sample of a medico-legal report drawn up in the form prescribed, I have selected the following, which refers to the protocol of the dissection at p. 219, because it is unusually short and concise, and yet contains all that it was the object of the examination to explain in that particular case, in regard to which it completely satisfied the legal authorities.

Medico-legal report in the matter of the inquiry respecting the mode of death of H.

H. 3. 52.†

"In conformity with the directions of the Royal District Commission of Charlottenburg, dated the 5th of this month, and referring to the above-mentioned inquiry, we have the honour to transmit to you the following document, constituting the medico-legal report required."

"According to report,‡ H., who had been for many years afflicted with epilepsy, disappeared upon a certain day, his body being soon thereafter found lying close to the bank of a turf-pit near Charlottenburg; he was reported to have been robbed, and therefore a medico-legal examination was rendered necessary. The dissection was performed by the subscribing medical inspectors, on the 26th of March, with the following results":—

A. *External Examination.*

(Here follows, word for word, the report of the anatomical appearances as given in the protocol of the dissection, printed at p. 219 from

* Compare with this section the Third Chapter in Part First.

† The reference numerals of the corresponding documents.

‡ In this case no documents were given us, only a copy of the minute of the dissection.

No. 1 to 34 inclusive, which we need not here repeat, but *without the addition* of the *provisional opinion* given at the time of the dissection, which it is superfluous to repeat in this report.)

"In our provisional opinion we have assumed as probable that the deceased had fallen into the water alive, and therein met his death, that he consequently was drowned, and we must still maintain this view. For not only were the signs of every other species of unnatural death awanting, since the trifling ecchymosis described under No. 10, being in no way connected with any important organ, could have had no influence whatever in producing death, and the marks upon the forehead and nose (mentioned under Nos. 4 and 5), were very probably made after death, and were at any rate of no importance whatever; but the results of the dissection also revealed the existence in the body of most of the appearances usually found in those drowned. Amongst these, medico-legal experience enables us to reckon the bluish coloration and wrinkled condition of the skin upon the hands and feet (7)—which of themselves, however, only prove that the body must have lain some time in the water—the so-called *cutis anserina*, which was quite distinct in certain parts of the body (8), the mud found in the fauces (9); and along with those external appearances of the body, the *corresponding* internal ones, which, taken together, are extremely demonstrative—viz., the visible congestion of the cerebral membranes (13), and of all the cerebral sinuses (18), the congestion of the lungs (20), of the coronary vessels of the heart, and of the right side of the heart itself (22); the remarkable distention of the lungs (20), the congestion of the liver and kidneys (23 and 31), and the fluidity of the blood in the body generally (22 and 34), which, as well as the appearances found in the stomach, must be regarded as particularly important symptoms. The stomach was distended with a watery fluid, in which were distinctly visible isolated particles of mud (26), precisely similar to that which we found upon the tongue and in the fauces, from which it incontestably follows that the deceased must have swallowed after falling into this muddy fluid; must, therefore, have been alive, since water cannot flow into the stomach after death; consequently, it cannot possibly be supposed that the deceased was already dead when he fell into the water; and this view is also supported by the other existing appearances symptomatic of death by drowning. The deceased has in fact died from apoplexy of the heart (asphyxia), like a great many of those that die in the water, has consequently been drowned. Had we

been asked whether the deceased had committed suicide, or met with his death accidentally or by the fault of a third party, we must have stated, that the dissection revealed neither proof nor probability of there being any third party criminally concerned with the death (by violently throwing the man, while still alive, into the puddle); while, contrariwise, it is a most probable supposition that H. met with his death in the water by suicide or accident, having been suddenly seized with an epileptic fit, for instance, while standing by the edge of the water, and so fallen in and been drowned. Should it really be found, which we know not, that the deceased has been found robbed, and close to the bank, this would in no wise militate against our view; for it is self-evident that nothing could be more likely than that a third party, seeing the body floating in the pool or lying near its bank, should drag it ashore and plunder it.*

"We accordingly declare it to be our opinion, that H. has fallen into the water alive, and died in it from drowning.—Berlin, 19th April, 1852.

"Casper. (Official seal.)

"Lütke, *chir. for.* (Official seal.)"

§ 54. Revision of the Opinion and Sequence of the Technical Courts.

A copy of all the medico-legal transactions of all the medical jurists in Prussia, both protocols and reports, without exception, is sent by each respective local magistracy to the provincial government, and through it, in quarterly budgets, to the Royal Medical College of the province, for its revision. The same procedure is followed in regard to all inquiries regarding lunacy or idiocy in civil law. This board, on its part, transmits their transactions, along with its remarks upon each, to the ministry appointed, in which both transactions and revisals are submitted to a super-revisal by its scientific commission, and the result is communicated both to the revising medical college and also to the medical jurists concerned, affording to the latter instruction or recognition and encouragement. Here we have no doubt a cumbrous official apparatus set in motion,

* It afterwards appeared, that there was not the slightest trace of any crime committed on the drowned man. What might not, however, have been made of this case in the medico-legal report, by means of a few judicious doubts and forced interpretations!

but this arrangement is indubitably successful in its operation, inasmuch, as not only does it maintain the central courts constantly acquainted with the doings of their medical jurists, but also indubitably has its share in the elevation of the practice of legal medicine in Prussia, to a perfection hitherto attained in no other country, a fact which must be acknowledged, and which has quite recently been recognised by a most competent authority.*

In § § 173-177 of the Code of Criminal Procedure, which we have already quoted, the cases are described in which the reference of a medico-legal report to the superior courts shall take place. The rule, and the practice in most cases, is for this report to be sent, along with the other documentary evidence, first, to the medical college of the province, and should the opinion of this board be from any cause disputed, they are then sent to the Royal Scientific Commission for scientific affairs, to obtain its *superarbitrium*. This is, as in the medical colleges, drawn up by two referees, who work each for himself; both of their opinions are then brought before a meeting of the commission, discussed, and that one which is approved of by a majority of the commission is accepted, signed, and issued.†

The question—how far the Judge is bound by the medical opinion, particularly by the *superarbitrium* of the highest and last professional court? is, as is well known, one that has been much disputed. We, however, do not require to enter into it here, as it is a purely legal question, and we only touch upon it to remark that in recent times, particularly in jury trials, it has lost all its practical importance, since the jury, after hearing the case fully in all its particulars, and with all possible medical light thrown upon it, bound by nothing but their own conscientious conviction, give their verdict solely in accordance with that. That this is often enough most remarkably and diametrically opposed to the medical opinion of the case, is well enough known to every one accustomed to frequent these courts!

Written testimony, to which, in its widest sense, belong the written opinions of individual medical men, or of the medical boards, is not legally admissible at the *vivâ voce* trial, except in the most urgent

* Mittermaier in Goldtammer's Archiv für Preuss. Strafrecht. Bd. i. hft. i. s. 13.

† A precisely similar sequence of professional courts is found in most of the German states. In some of the smaller ones, which possess no medical boards, the opinions of the medical jurists is sent, along with the documentary evidence, to some faculty, either at home or abroad.

and unavoidable cases. Since the introduction of this procedure,* therefore, it has often happened that the medical colleges and the scientific commission have been requested, in cases in which they had given their opinions, to depute the author of such written testimony, or some other member of the college to attend the public trial, and orally defend its views. Any such defence of a collegiate opinion by any one member, even though he were the originator of the same, is, however, manifestly impracticable, because in the course of the trial new questions turn up, which the delegate of the medical board can only answer as an individual expert, and not as the representative of colleagues who are not consulted. Moreover, this custom is physically impracticable, particularly for the central scientific board, which comprises the whole monarchy in its district, and there are many other reasons against it. Having duly considered all these circumstances, the highest board of administration have recently decided, that the sending of deputies from the medical boards to attend the trials is no longer to be required, and that any qualified physician residing in the neighbourhood, having had the opinion communicated to him, may be required to defend the same *vivâ voce* at the trial.

About 1849. Public oral trial by jury is still in use in Prussia only in the more serious criminal cases.—TRANSL.

SPECIAL DIVISION.

PART FIRST.

FORMS OF VIOLENT DEATH.

SECTION FIRST.

Mechanical Death.

STATUTORY REGULATIONS.

Penal Code, § 185. *In determining the fact of a death, it does not fall to be considered whether the fatal issue of an injury might have been prevented by timely and judicious aid; or, whether any similar injury has been in other cases cured by the aid of art; or, also, whether the injury has only produced a fatal result by reason of any peculiar bodily condition of the person killed, or by reason of any accidental circumstances under which it was inflicted.*

§ 1. GENERAL. (*a*) DEFINITION OF AN INJURY.

The influence of criminal law and the erroneous views of medico-legal authors has been more strongly felt in regard to no other point in legal medicine than in respect of the questions regarding injuries. This is at once apparent when we reflect upon the double meaning which the customary usage of our language has attached to the word "injury." A. has *inflicted* an injury upon B.; B., by this act, has *received* an injury: A. has been the active agent, B. has been the passive one,—cause and effect. The act of stabbing, or cutting is an injurious procedure, "an injury;" the resulting stab, or cut, is also

an "injury." The science of penal law is obliged to make use of the customary forms of speech, and to reform them scientifically to its ends; it must fix its eyes at once upon the injuring action and its result. But how comes it that legal medicine, ever striving after a correct and proper apprehension of her task, should go wandering among definitions of the injuring *action?* She, that has solely to do with the natural object, in this case the body wounded by the injuring actions? Theoretical book-makers are far at sea, if they think that the medical jurist in his official capacity can ever be placed in a position to require, or even to dare to make use of, their discursive essays on "objective and subjective injuries;" upon "*dolus* and *culpa*," in relation to the injuring action, &c. The *wounded man*, alive or dead, is given to the medical jurist by the law, as the object of his investigation. It is no true rejoinder to the view we have taken to say, that the physician may be asked such accessory questions as those relating to the nature of the implement employed, the situation and position in which the wounded person or his antagonist was placed at the time the deed was committed, and the probable degree of force employed in inflicting the injury, since the answers to all such questions lie within the sphere of medical knowledge and experience. A professional examination of the wounded man is necessarily required to determine, for instance, whether the shot has come from below or not, whether the wound corresponds with the blunt bread-knife stated to have been used, or perhaps rather with a pointed dagger, the suspected weapon, &c. Thus, still the natural object alone, and nothing but it, comes under the cognizance of judicial medicine! Hence, therefore, an "injury" may be simply defined as: EVERY ALTERATION OF THE STRUCTURE OR FUNCTION OF ANY PART OF THE BODY PRODUCED BY ANY EXTERNAL CAUSE. Under the first head are included all solutions of continuity, such as wounds, divisions of blood-vessels (hæmorrhage and ecchymosis), burns, prolapsus, fractures, and dislocations. Those injuries included under the second head are by no means always accompanied with solution of continuity, at least to any material extent; most frequently they consist only in concussion, contusion, and loss of power.

§ 2. CONTINUATION.—(*b*) FATAL CHARACTER OF THE INJURY.

It was reserved for our own century to institute one of the most useful reforms in the science of criminal law, and to give the quietus to

a doctrine which has been rightly termed by a distinguished teacher (Stübel) a "blot" upon the science and "a refuge for murderers." We have no desire ourselves to fall into the error we have so often blamed, of encroaching on the province of the law, nor have we any intention of writing a history of judicial medicine, to which, fortunately, belongs now-a-days the old, untenable, absurd, deceitful, and dangerous doctrine of degrees of lethality; we have only to point out in a few words, how, since the criminal law has set aside the "absolutely fatal character of the injury" from being the criterion of the fact of the homicide, every such minute subdivision of the character of the injury into—not absolutely fatal, accidentally, or for the most part fatal, fatal from individual causes, &c., has also ceased to be of any categorical importance. Every European legislative act relating to such matters (so far as I know) is now founded upon the amended doctrine of modern science, that *every case of fatal injury must stand upon its own individual footing, and every colligation of cases under general categories must be rejected,* that only takes cognizance of "the fact that death has resulted from the injury in the individual case, and cares not to know whether by a lucky chance, or combination of favourable circumstances, whether intrinsic or extrinsic to the injury, death might have been averted. It is surprising to see how science and the legislation, and practice based upon it, have taken two centuries to discover that the death of one man from an injury given by another, is precisely the same as if he had been strangled or drowned by him, and that suspension or drowning are not of themselves "absolutely fatal," inasmuch as death may be readily averted in the one case by instantly cutting the cord, and in the other by speedy removal from the water!

It is impossible for a statutory regulation founded upon the modern views to be clearer or more distinct, than that most excellent one to be found in § 185 of the Prussian penal code, which we have already quoted. The "determination of the fact of the death" in itself, can henceforth be the only task assigned by the law to the medical jurist, that is, in other words, the answering of the query:—Did the deceased die of and from the injury? The answer to this may be affirmative, although it is evident, "that timely or appropriate assistance might have averted the fatal result" (that the injury, therefore, had been one fatal *per se* in the sense of the ancients), or, that perhaps in another case, "an injury of this nature has been cured by art" (an injury fatal *ut plurimum*), or, that the

injury, which meanwhile has killed the man, has done so "only because of some peculiar bodily condition of the deceased" (an injury fatal individually); or, finally, that the injury would not have proved fatal had it not been for the coincident influence of certain "accidental circumstances under which the injury had been inflicted" (an injury fatal *per accidens*). It betrays a complete misapprehension of the actual state of matters, and of the true meaning of the statutory paragraph referred to, to say, that by it the greatest injustice may be brought about. Since, if for example, A. fires a bullet through B.'s head; or C. gives D. a blow with his fist upon his breast, within which lay a heart already, from disease, disposed to rupture, and which is actually ruptured by the concussion of the blow, so in both instances, death has plainly been the result of the injurious treatment, and "the fact of the death" (from the injury) must be regarded by the physician as "proved," while it must be apparent to the most unprejudiced, that in the eye of the law the two criminals stand by no means on the same footing. Most certainly not—and the legislator has fully recognised this, but in every case in which he demands a medical opinion in answer to certain questions, he expects not merely a simple Yes or No, but that the affirmative or negative should be supported by scientific reasons, and adapted to the case in point. In the first place, then, a reasoned *consilium medicum* is given in; in such a case as that mentioned, the Judge will receive in this report every information respecting rupture of the heart, and concussions of important internal organs, &c., and having done this, the medical jurist has done all that his experience and his knowledge entitle him to do, whilst so soon as he goes beyond this, and, according to the olden dogma, enters upon the topic of the degree of lethality and general categories, he loses himself at once in hypotheses, or in purely personal opinions. We can assure the medical jurist that both Judge and jury will certainly award the perpetrator of the death his due meed of punishment in accordance with his reasoned opinion. For the words "does not fall to be considered," occurring in the part of the statute quoted, and relating to every accessory circumstance, have no reference to any decision as to the culpability of the perpetrator, but evidently *only* to the "determining *the fact of the death*," refer, therefore, only to the function of the physician, and not to that of either Judge or jury. The task of the physician now-a-days, therefore, in every case of fatal injury of any kind, differs in no respect from what he has to do in the

case of violent death from other causes, and has in the one case only to make out, that the deceased has died from injury, as in the other, that he has died from drowning, that is, has fallen into the water alive.

§ 3. Continuation.—(*c*) Of the Organ injured.

Another foreign element from which legal medicine must be purified, is the consideration of the various corporeal injuries in connection with the different organs. While the treatise writers have on the one hand forced upon the attention of the judicial physician all sorts of legal doctrines and theories, with which he has nothing to do, so on the other, they have degraded him to the position of a tyro in his own peculiar department. It is not easy to escape from the trammels of ancient traditions, and therefore, we are continually taught what injuries of what particular bones are more fatal than others, why injuries to the pregnant uterus are more dangerous than to the non-pregnant one, under what circumstances injuries to the intestines are fatal, under what others they are less dangerous, &c. This is a tradition derived from the primitive times of legal medicine, in which the consideration of corporeal injuries were the sole or chief task of the "medical expert" consulted in criminal cases. But the matter in question is a *purely surgical one*, and surgical knowledge, as well as every other kind of medical knowledge, must be presupposed of every medical jurist, and of every Handbook of Judicial Medicine. Nowhere, and particularly not in Prussia, is any candidate for a medico-legal appointment admitted even to his qualifying examination, still less to the appointment itself, until he has satisfied the board that his medical education is complete, that is, that he is a fully qualified physician, surgeon, and obstetrician (so it is in Prussia at least). It is perfectly superfluous to teach such an one, or consequently any medical jurist, that injuries of the skull may damage the brain by the splintering of the internal or vitreous table; that in the case of an injury of the brachial artery, death may be averted by the application of a ligature, but that this cannot be done where the arch of the aorta is wounded; or the dangers that attend wounds of the joints, &c.,—all doctrines, therefore, regarding the danger and mortality attendant upon the various injuries of the different parts of the body are to be consigned to the Handbooks of Surgery.

§ 4. Continuation.—(*d*) Idiosyncrasy and Accidental Circumstances.

The case is precisely similar in regard to the categories comprehending idiosyncrasy, and the so-called accidents that accompany, follow or are accessory to the infliction of the injury, and increase its danger. Irrespective of the fact that these influences "are no longer to be considered in determining the cause of death" (§ 1), it is indubitable that any considerations regarding their action, particularly that of idiosyncrasy, must be purely speculative and conjectural, and everything of this character in legal medicine is in the highest degree questionable, and as far as possible to be avoided. We know little or nothing for certain as to the reason why ten men wounded in the intestines will die from inflammation and its consequences, whilst in other ten a similar or even more serious injury of the intestines, under apparently similar circumstances will terminate in recovery. No doubt in both classes of cases idiosyncrasy acted unfavourably or favourably; but who shall prove this to the Judge? How much more remarkable is this influence of idiosyncrasy in cranial injuries! Moreover, from the nature of the case the medical jurist, almost without exception, first becomes acquainted with those persons on whose case he has to decide, as bodies upon the dissecting table. And can he conscientiously pronounce an opinion regarding the "idiosyncrasy" of such men? Cases of palpable and apparent peculiarities, which may have had an influence upon the fatal issue of the injury, as, for instance, a remarkable thinness of the cranial bones, transposition of the internal organs, &c., are of the utmost rarity, as every expert knows, and in by far the greater number of cases, particularly at the time of the medico-legal inspection, the medical jurist is completely ignorant of the idiosyncrasies of the deceased. Whatever information on this head he may be able to obtain from the preliminary history of the case will be duly supplied to him, to be made use of in drawing up his reasoned opinion in the report of the inspection, not therefore to be used abstractly, but applied individually. And now we have to consider, in the second place, what we have just referred to in § 3, the fact, namely, that general medical science, and not the specific doctrines of medical jurisprudence, must form the groundwork of the opinion given.

Judicial medicine is not required to impart the knowledge that

ossified arteries are found in old age but not in childhood, that, contrariwise, it is possible to stab a new-born child through the fontanelles, but not a grown man; that an injury to an aneurism may cause fatal hæmorrhage, whilst other individuals may be wounded in the same part of the same vessel ten times, or oftener, without any such occurrence.

All this is also true of the so-called accidents,—intoxication, removal, distinct and great neglect in the treatment of the wounded person, &c. It is well known how often in various places the last-named point, the estimation of the share of the blame of the death attachable to the medical treatment of the injury, has led to the unnecessary exaggeration of the case, to the tedious protraction of it through all the professional courts, and often to extremely disagreeable differences of opinion. The greatest scope for such discussions was given by such injuries to the head as proved fatal from their sequelæ, particularly from suppuration, and injuries of the limbs resulting in amputation, followed by pyæmia, which has carried off the patient. How must the medical jurist have turned and twisted in order to attack or defend a trepan operation or amputation, which either has or has not been performed, or the application of a dozen leeches, more or less! And perhaps, after all, the medical board following him may have taken a diametrically opposite view of the case, and supported their opinion by a reference to not less correct general medical precepts! And all this time the only important point for the Judge—the "determination of the fact of the death"—remained uncared for, since it often enough happened that the result of all these medical subtleties and controversies was to make it appear to the Judge as if the blame of the death of the injured person was more distinctly referrible to his medical attendant than to the person accused. But however difficult it may have been to decide forensically respecting such cases formerly, it is easy enough now. The injury to the head has been the cause of the death. Here we have "the fact of the death determined," the requirements of the statute fulfilled, and the Judge set on firm ground and satisfied. Why the injury to the head has in *this particular case* produced suppuration of the brain, and why this has perhaps not been early enough recognised, or could not be so, &c.; all this has to be gone into in the reasoned report, which still however, ends by recapitulating—"The injury to the head has caused the death."* Discussions, such

* Such cases possess no true medico-legal interest, and are not quoted

as—whether a state of intoxication at the time of the receipt of the injury is to be reckoned an idiosyncratic or accidental circumstance? and the like, belong fortunately to a period in our science, which, with all its subtleties and controversies, is now luckily historical. Judicial medicine is a science of itself, and is not a mere encyclopædia of the other medical sciences. It therefore has only to treat of those points not referred to in the teachings of the other medical sciences, and which belong more particularly to itself, and to avoid the introduction of anything irrelevant, and particularly of all merely introductory information.

amongst the cases illustrating my observations, except where the appearances on dissection were of themselves important.

CHAPTER I.

DEATH FROM FATAL MECHANICAL INJURIES.

§. 5. General.

We have already (§ 24, page 58) explained what we understand by injuries of this nature. These injuries leave the most palpable traces of their operation on the body; they are often attended by various circumstances, which in other cases prove the exclusive cause of death, such as hæmorrhage, concussion of the brain, &c., but the occurrence of which in these cases is of no material importance, since the disturbance or destruction of the mechanical organism of the body alone, or at least of its more important organs, which injuries of this kind produce, is sufficient to render the continuance of life impossible. These injuries are produced by the falling of walls, beams, masts, by blows from windmill sails in motion, by the passage over the body of carriages or railway trains, by the body becoming entangled in machines, by squeezing new-born children into boxes, &c., by falling or being pushed or thrown from a considerable height, and upon hard bodies, by rough and violent ill-treatment, by forcible blows, cuts, &c., and in many other ways.

§ 6. Experiments on the dead body.

In § 33, and its illustrative cases, I have shown how often, in cases of sudden death from injuries, when death has occurred from internal and not from external causes, there is often no trace of injury visible externally which could betray the nature of the case. This circumstance, as well as the desire to investigate how far it was possible for a criminal to mask the actual cause of death, and obscure the case by producing injuries on the body of the deceased, just as murderers often attempt to conceal their deed by burning the body, as well as to discover what relation the resistance of the dead organ bore to that of the living one, led to the experimental

production of injuries upon dead bodies. I have had uncommonly numerous opportunities of instituting these experiments, and I still continue to repeat them every academical session. Similar experiments have not previously been made anywhere on so great a scale, except in the case of experiments on burning, to which I shall refer under the head of "death from burning" (§ 16, &c.), and they have been attended by the most astonishing results. *It is extremely difficult to break up the organic cohesion of dead organs.* In saying this, of course, I do not refer to stabs or cuts through the skin and muscles. Our experiments, in respect to mechanical injuries, were confined to fractures of the bones, ruptures of the internal organs, and injuries (alterations) of the cuticular surface.

(1.) *Fractures of the Bones.*—If we endeavour to fracture the skull of a dead adult, we shall find that an amount of force which, if applied during life, would indubitably have produced fissures, if not fracture or complete smashing of the skull, leaves the dead skull quite uninjured. In making these experiments we have usually employed the wooden mallet used to prop up the skull and spinal canal during the process of dissection. In other cases we have employed hammers and similar weapons. The most powerful blows struck downwards upon the body laid horizontally were mostly without result, and only after repeated violent blows were we enabled to produce perhaps one or a few fissures in the occipital or parietal bones, or in the temporal bone (squamous portion), and certainly more easily in the latter. We were unable to produce more considerable effects, such as complete smashing of the skull or fissures of its base, even in one single instance. The dead scalp seems to have considerably more power of resistance than the living one, and after its removal, fissures of the bones were more easily produced by similar blows. Numerous and uniformly consonant experiments have enabled us to establish this dogma: that when from any cause, such as complete putrefaction, it is no longer possible to ascertain whether the injuries discovered in a body have been inflicted before or after death, the existence of considerable injuries of the cranial bones, particularly of the solid bones of the *basis cranii*, enables it to be assumed, with at least the utmost probability, *that the injury has not been inflicted after death, but during life,* when there is no other evidence to show that some extraordinary degree of violence has been inflicted on the body.

All the long bones of the extremities are found to display quite an

extraordinary power of resistance. The most powerful blows upon upper and under extremities lying horizontally on the table, both on the humerus and femur, as well as on the bones of the forearm and leg, and even on the same bones when supported only at their two ends, produced in general not only no fracture, but even not the slightest fissure. Malgaigne's experiments are in the main extremely consonant with ours. He says, indeed, that he has very often with an "*enormous* iron lever" broken every long bone in a dead body (which need not surprise us!); but he adds thereto that (even with the employment of such force), "he was often only able to produce incomplete fracture."* The brittle bones of old men (above 70) are, however, more easily fractured by powerful blows. But even such bones are much more easily broken by the same blows after removal of their coverings—skin, fat, and muscle. Should we inquire as to the reason for the difficulty of producing fractures in the dead body, we might readily find it in the absence of muscular action, which has such a powerful effect in the living body.

The *ribs* are more easily fractured in the dead body than in the long bones, but the fracture is always a simple cross one, and is never splintered.

On the other hand, we have never succeeded in fracturing the *larynx* or *os hyoides* of an adult, even by the most powerful pressure, such as would inevitably have produced it during life. These experiments are of the same practical importance as those made upon the skull, and in accordance with them I should have no difficulty in assuming, even in a case where putrefaction had already obliterated every trace of living reaction, that *any existing fracture of the larynx or os hyoides must have been produced previous to death.*

(2.) We have only made a few experiments upon the rupture of internal organs, because no important practical result was to be expected from them. The most violent blows, with beams and the like, upon the regions of the liver and spleen have not been attended with the slightest result.

(3.) Our innumerable experiments to produce by mechanical injuries upon the skins of dead bodies alterations somewhat similar to those caused by the reactionary phenomena of life, have been already detailed (§ 33 Gen. Div., *sub* 2. p. 117), and to those details I now beg leave to refer the reader.

(4.) Our further experiments in regard to strangulation, burning,

* Knochenbrüche, &c., Uebers. von Bürger. Stuttgart, 1850, s. 31.

and gun-shot wounds in the dead body, as well as on rupture of the umbilical cord, will be detailed below in their proper places.

The following two capital cases which have come before us recently, may serve to show the great practical importance of the experiments here related, as well as of the question upon which they bear.

Case LXXX.—Comminuted Fracture of the Skull—has it occurred after Death?

S., aged 60 years, had, five years previously, been almost instantaneously killed in his mill, as was given out, by falling from a beam upon the millstone, a height of seven feet and a-half. Two years after, a suspicion arose that the party now accused had killed S. in the mill with a heavy pickaxe, such as is used for hewing the millstones, and the body was therefore ordered to be exhumed. Complete and comminuted fracture of the skull was found. The question then arose—Has this injury been occasioned by the fall above-mentioned, or by blows by a pickaxe? The former assumption was maintained by the district physician in opposition to the views of Dr. N., who occupied the position of district surgeon, and this view was also supported by the medical college of the province concerned. The physician also subsequently brought forward the supposition that the cranial injuries might also have been produced after death, and this supposition he firmly maintained in sundry discussions, in spite of every opposition made to it. At the request of the Attorney-General, I was deputed to settle the matter at the jury trial at —, the *corpus delicti*, the skull, being produced in open court. Almost the entire left half of the *basis cranii* was wanting, and there were at least twenty separate pieces of broken bone. It was impossible to regard so serious a comminution of the base of the skull as the result of a fall from a height so trifling as to amount to no more than seven feet and a-half, when carefully measured, since such fractures affecting the base of the skull, according to all our previous observations, always presuppose the exertion of very considerable violence (*Vide* p. 132), and in this case the cranial bones were by no means remarkably thin, but were of the usual thickness. It was just as impossible to suppose that the fracture had been produced after death, as the experiments just related prove. Moreover, it seemed scarcely possible to explain such an occurrence, since the deceased died in his own house, among his family, and was buried at the usual early period. On the other hand, the heavy iron

pickaxe produced must be regarded as a very fit weapon to produce such a comminution of the skull. The accused was condemned.

Case LXXXI.—Fracture of the Ribs.—Has it been produced after Death?

The decision of a medical board regarding a most atrocious crime gave occasion to the consideration of this query. An old peasant and her daughter were placed at the bar at —, accused of having conjointly (!) robbed and murdered a woman aged seventy-five years, which they subsequently confessed. The results of the dissection indubitably proved that the deceased had been choked, after a long struggle, which was proved by the existence of many injuries and excoriations, and by the sand and blood in the hair and down the back, caused by dragging the body from the bed and along the floor of the room. Whilst the daughter held both arms of the deceased, the mother knelt upon her breast and compressed her mouth and nose so forcibly that the mouth was lacerated. The experts differed respecting the fractured ribs which were found in the body; on the one hand, the medical experts supposed that these—mostly double-splintered fractures on both sides—might have been produced by "falling from a very considerable height with the breast against some soft body (as a dungheap)," just as well as by kneeling upon the chest; on the other hand, the medical college of the province supposed that the fracture of the ribs must have been produced after death, since no trace of living reaction had been described as existing by the medical inspectors. Summoned as arbiter before the jury court at —, I could not regard either supposition as correct. A fall upon such a soft substance as a dungheap could not produce such a number of fractures on *both* sides, and, moreover, the actual circumstances of the case gave no countenance to the supposition of any such possibility. Our own numerous experiments upon dead bodies enabled us also to state positively that it is impossible to produce *such* fractures of the ribs after death (*Vid.* p. 246); and neither could we agree to the truth of the reason assigned for this supposition, viz., the want of vital reaction, for reasons which we have already given (pp. 109 and 118), and which we have illustrated by many cases in proof. Moreover, roughly kneeling on the chest of a woman, aged 75, was amply sufficient to fracture her ribs. In consequence

of this opinion, the mother was condemned to death, and the daughter to many years' imprisonment.

§ 7. Effects of Mechanical Injuries.

The diagnosis of this form of death is generally very easy, by reason of the remarkable appearances found on the body.

We have already (in §§ 35 and 36 of the General Div.) given details respecting the sharp and blunt weapons with which wounds may be occasioned, and in regard to what may be so produced in the living body. There is no possible actual effect or living reaction which may not result from injuries of this character, from a suddenly fatal neuroparalysis from concussion of the brain or spinal marrow, to a lingering death from a chronic inflammation and suppuration of important organs, such as the brain and its membranes. In other cases we may have the body shattered in pieces, limbs torn from each other, internal organs severed from their connections, dislocation, fractures, contusions, wounds, ruptures of muscles, of blood-vessels, of internal organs, and frequently three, four, or more of such easily recognisable causes of death in one and the same body. The following cases, taken from a large number of selected ones, will sufficiently exemplify our statement:—

§ 8. Illustrative Cases.

Case LXXXII.—Death from a steam-carriage.

Among many cases of voluntary and involuntary deaths from railway trains, the following, that of a saddler about 30 years old, killed accidentally, was in truth the most horrible. Scarce any region or any single part of the body remained uninjured. The scalp was not much torn, but in it rattled the skull-bones, completely comminuted. The left ear was torn off and lost. Both arms and both legs were much crushed, torn, and broken, so that each extremity lay zigzag fashion on the table. From the fractured parts, as well as from the torn abdominal coverings of the left side, the lacerated muscular substance protruded. The scrotum was ruptured, and the left testicle, still attached to its cord, lay free and uninjured amid the twisted thighs! and yet the features of the countenance, which was not much injured, were perfectly peaceful, which was easily enough

explained by the extremely sudden, and therefore probably painless, death.

Case LXXXIII.—A new-born Child completely smashed by a railway train.

The head and neck of the child were crushed off, the cervical vertebræ smashed, the collar-bones and superior ribs separated from their connections, the umbilical cord cut across and properly tied. The trunk was ten inches long, and weighed one pound and three-quarters. The soft woolly hair on certain parts of the body, the wrinkled condition of the skin on the extremities, the thin, scale-like nails, and the still gaping *vagina*, all pointed with considerable probability to the fact of the child not being mature; but certainty upon this point could not be ascertained, from the great destruction of the body and the total absence of so important a part as the head, neither could the hydrostatic test be applied, and therefore it remained undetermined whether the child had lived, and whether the head had been severed from the body during life.

Case LXXXIV.—Fracture of the Mastoid Process by being driven over by a carriage.

One of the rarest of all possible injuries to the head, was found in the body of a girl, aged six, killed by being driven over by a carriage. The seventh rib on the left side was smashed, the skull was fractured in six places, and amongst these was a fracture of the left mastoid process, which was completely broken off. In the left lung, there was also a rupture three inches long.

Case LXXXV.—Rare Fracture of the Skull by being driven over by a carriage.

In this case, also, the extreme violence employed had produced one of the rarest injuries to the head. A girl, aged three, had been driven over by a carriage and killed upon the spot. The squamous portion of the temporal bone on the right side was split off, and a transverse fissure extended across the occipital bone into the *foramen magnum*. Finally, the petrous portion of the left temporal bone was also split by a fissure.

Case LXXXVI.—Cranial Injury from being driven over by a carriage.

A man-servant, aged 29, was driven over, and died in five hours. In the left temporal bone there was a fissure with that narrow border of ecchymosis which one so usually finds in recent fissures of the cranial bones. This fissure extended across the base of the skull into the *foramen magnum*. Beneath this fissure, and lying upon the *dura mater*, there was an extravasation of not less than four ounces of dark coagulated blood, which had made a deep impression in the brain. The bladder was found (from paralysis) perfectly distended with urine, as often happens in similar cases, which are not fatal immediately, but after a short interval. Nothing else anormal was visible.

Case LXXXVII.—Cerebral Hæmorrhage from being driven over by a carriage.

A *virgin, aged seventy years,* was driven over, and taken to the Charité, where she died in two days. Over the left parietal bone there was an S-shaped sharp-edged wound, and one inch removed from it, there was a flap of separated skin two inches long, the portion of scalp dividing these two wounds was also separated from the bones. Upon the cranial coverings there were on both sides isolated extravasations of coagulated blood, amounting in all to about two drachms (imp.) in weight. All the other organs were uninjured, only the whole of the cellular tissue of the true pelvis was infiltrated with blood. (The *Hymen* of this aged person was uninjured, and as tight as in a girl of 14 or 15. Both uterus and ovaries were atrophied, and in the right ovary of the aged virgin there were several quite distinct Graafian vesicles.)

Case LXXXVIII.—Cerebral Hæmorrhage from a blow.

In this case the pole of a waggon, in motion, was said to have struck an old woman of 65, in the left side, and thrown her down on the stone pavement. She was picked up senseless, and died in a few hours. There was no trace of injury on the body. The cranial bones—of the unusual thickness of a quarter of an inch—were also

uninjured. The cerebral membranes were, however, very strongly hyperæmic, and the whole brain floated, so to speak, in a layer of coagulated blood, two lines thick. It was decided, that this cerebral hæmorrhage (so rare in its extent), could only have been caused by external violence, and that a headlong fall upon a stone pavement, was a very probable cause.

Case LXXXIX.—Rupture of the Intestines by a blow?

This case was somewhat akin to Case LXVIII. (p. 167), since in it also the injury received had no connection with the death, although the reverse seemed to be highly probable. A dragoon standing in the street, was struck on the *right side* of the abdomen by the pole of a passing drosky. Three days subsequently, he was seized with vomiting and violent pains in the abdomen, and died in nineteen hours, perfectly conscious and with all the symptoms of loss of blood. The medical man in attendance had not observed any trace of injury on the spot where the blow had been received. We found the body (in June) already green, &c.; in the abdominal cavity there was about a pound of decomposed blood and intestinal contents, and the source of this extravasation we found to be in a portion of small intestine lying on the left side, in which there was situate one of the well-known perforating intestinal ulcers, perfectly circular, three-quarters of an inch in diameter, surrounded by a kind of rampart of tolerably smooth everted edge, which was livid from putrescence. It was perfectly evident that this effusion had been the cause of death; and the history of the case and the appearances on dissection, showed also that death had not resulted from the injury received, since it could not have produced such an ulcer, particularly on the opposite side, and if the blow had only completed the perforation of the ulcer, the symptoms which came on subsequently must of necessity have instantaneously displayed themselves.

Case XC.—Rupture of the Perineum from being driven over.

A boy, aged 7 years, was run over by the enormous weight of an omnibus; one of the wheels passed over his abdomen. At the dissection, the whole of the right iliac region was externally dark-red and ecchymosed. The perineum was ruptured in such a manner, that an irregular wound with smooth, unecchymosed edges, five

inches long, following its zigzags, extended from the scrotum to the coccyx; this wound was two inches in width, and permitted the interior of the pelvis to be seen. The *sphincter ani* was also ruptured, but there was no other injury visible in the whole body. The bladder was distended, and rose above the pubis,—easily explicable from the fact, that the poor boy died twenty hours after receipt of the injury, and the fearful crushing must of course have produced paralysis of the bladder.

Case XCI.—Rupture of the Spleen from collision.

A girl, aged 14, was crushed against the wall of a doorway by a waggon, and died twelve hours after. The body exhibited the waxy-white colour which, under the circumstances, led at once to the supposition of internal hæmorrhage from rupture of some organ. The *only* external trace of injury was three brownish-red leathery patches on the left shoulder-joint; in particular, there was no trace of injury in the abdomen. Nevertheless, as it accorded with our previous extensive experience (*Vid.* § 33, Gen. Div., *sub.* 1), we were not at all surprised to find the spleen ruptured; in its middle there was a rent one inch long and two lines deep. Three ounces of blood, partly fluid and partly coagulated, were effused into the abdominal cavity; no other injury existed. The general anæmia was, however, so great, that the lungs appeared almost of a greyish-white. The right side of the heart also contained a tolerable quantity of blood. The continuance of life for several hours after such a rupture is nothing remarkable. Among the cases immediately following will be found many still more striking examples of how comparatively long life may continue after even the most fearful and manifold coexisting ruptures.

Case XCII.—Fracture of the Cervical Vertebræ and Laceration of both Trachea and Œsophagus from being driven over.

This case was that of a man-servant, aged 30. There was no doubt that the wheels of the waggon had passed over both the neck and upper part of the chest, and had produced the following fearful mutilations. The neck was encircled, and the upper part of the chest covered, with extensive ecchymoses, and fracture of the cervical vertebræ, and of the right shoulder-blade were distinctly to be felt

by external manipulation. The shoulder-blade was found to be fractured across, the odontoid process was found to be broken off, and its articular groove separated from the atlas, so that on dividing the soft parts the cervical column immediately projected, while at the point of division the cervical spinal marrow could be pressed out as a bloody pultaceous mass. Besides these important injuries, both the larynx and œsophagus were found to be torn off; the first lay in the chest behind the *manubrium sterni;* finally, the right carotid artery was also ruptured! In the chest, in both pleural cavities, there lay masses of black coagulated blood. Lungs, heart, kidneys, and *vena cava* were completely empty of blood. The lateral ventricles contained treacly blood, and the cerebellum was also covered with it.

Case XCIII.—Fracture of the Ribs; Rupture of the Lungs and Liver by being driven over.

A stout boy, aged seven years, was run over by an omnibus, and died in a few minutes. Externally, no trace of injury was found upon the body (p. 109), except that an emphysematous swelling of the left side pointed out the probable existence of fracture of the ribs. And there was, in fact, a transverse fracture of the sixth rib on the left side, while the last true rib on the same side was also fractured incompletely. Both of the lungs were healthy, and contained no blood. In the upper lobe of the right lung we found a rupture one inch and a-half long and one inch deep, and on the posterior surface of the lower lobe of the same lung there was another rupture, two inches and a-half long and one inch and a-half deep. Both ruptures had sharp edges. In the right pleural cavity there was about eight ounces (imp.) of dark, treacly blood. The thymus gland was still one inch and a-half long and three-quarters of an inch broad. On the concave surface of the right lobe of the liver there was a vertical rupture one inch long, and the right lobe was separated from the left by a rupture three-quarters of an inch in length. About four ounces (imp.) of blood had flowed from these ruptures into the pelvic cavity.

Case XCIV.—Fracture of the Pubis from being driven over.

The wheels of a waggon passed across the inguinal region of

a young man of 16. Well-marked ecchymosis existed in both groins in the left inguinal region; the soft parts were burst, so that the abdominal cavity lay exposed to view. The muscles of both thighs were torn across close to the pelvis, and the horizontal ramus of the pubis was fractured across right into the *foramen ovale*. The soft parts of the back, sacrum, and hips were all torn off and lay loose, and the deeper-seated parts were infiltrated with blood.

CASE XCV.—FRACTURE OF THE RIBS AND DORSAL VERTEBRÆ; REMARKABLE CONCUSSION OF THE HEART FROM THE FALL OF A WEIGHT.

In hoisting up a bag of corn it fell upon a man, aged 66. The chief visible consequence of this was a comminuted fracture of the right thigh, which was amputated. Death ensued the day after the operation. At the dissection (in June) the stump was most unhealthy (ichorous). There was also a remarkable general want of blood. The two first ribs were fractured, and of this no ecchymosis gave any external intimation. The appearances found in the heart were, however, most remarkable. On the right side of the pericardium we found an ecchymosis the size of half-a-crown, and in the left wall of the heart itself, running from the auricle to the ventricle, there was an ecchymotic stripe, two inches long and a quarter of an inch broad. Here, therefore, there had been a true and most singular concussion of the heart! An ecchymosis, the size of the palm of the hand, in the region of the third dorsal vertebra, intimated the existence of some deeper-seated injury, which was found to be a complete transverse fracture of the spinous process of this vertebra and also of its body, the spinal marrow being uninjured. This man lived *eight days* after the receipt of his injuries!

CASE XCVI.—FRACTURE OF MANY BONES, WITH RUPTURE OF THE LIVER FROM THE FALL OF A MAST.

A sailor, aged 60, was struck down by the fall of a mast, and died after six hours. *There was no trace of any ecchymosis to be found over the whole body,* and nevertheless we found the following injuries:—There was a small fissure in the right orbital plate of the frontal bone; on the right side five ribs were fractured, from the third to the seventh inclusive, and about six ounces (imp.) of serum

were effused into the pleural cavity; at the posterior surface of the liver there were four lacerations, obviously caused by the protruding ends of the fractured ribs, and about six ounces (imp.) of blood effused into the peritoneal cavity; further, the bones of both forearms were transversely fractured; and, finally, the right femur was completely splintered; and, nevertheless, not the slightest ecchymosis had formed on the surface of the body, though the deceased had lived six hours.

Case XCVII.—Rupture of the Liver, Spleen, the Omentum and the Stomach, by a blow from a windlass.

In hoisting a heavy weight of grain, the handle of the windlass jerked backwards, and so severely injured the man (aged 53) engaged in hoisting that he died in a few minutes. No proper ecchymosis was found upon the body, only over the upper part of the abdomen there was a patch of skin six inches long, that cut leathery, and was of a reddish-brown colour. And yet the internal appearances were so important! A quart and a-half of dark watery blood was effused into the abdominal cavity, and its source was evident. On the upper surface of the liver there were thirteen or fourteen shallow lacerations, which only penetrated to the depth of about a quarter of an inch. Similar lacerations were also found on its inferior surface. Moreover, the left lobe of the liver was completely crushed and hung like a fibrous mass from the rest of the organ. The posterior surface of the stomach exhibited two transverse lacerations, three to four inches long, of which one was close to the small curvature, and the other two inches above the great one, an extremely rare occurrence for rupture of the healthy stomach almost never occurs (*Vid.* § 36, Gen. Div., p. 134). Finally, we found the spleen completely smashed, and the great omentum—also a most rare occurrence—exhibited a laceration three inches long. Of course, the body was generally anæmic, except the veins of the *pia mater*, which were much congested (*Vid.* Death from Hæmorrhage, § 21, &c. Spec. Div.).

Case XCVIII.—Comminuted Fracture of the Skull from the fall of a drawbridge.

A steersman, aged 45, died an uncommon death. Standing on

the deck of his vessel as it passed beneath a drawrbidge; the bridge-master let the bridge fall too soon, and the head of the unfortunate man was caught between its valves! The assumption of carelessness rendered a medico-legal investigation necessary, in the course of which we found general anæmia of the body, and such an amount of injury to the head as is only to be found after the application of the utmost violence, as happens in the passage over it of heavy waggons, railway trains, &c. The whole of the right side of the head was visibly flattened against the left, and from the lobe of the ear, which was torn, to the lambdoidal suture there extended a gaping, sharp-edged wound, dividing both the soft parts and the bones, and through which the brain could be seen, looking like a blood pultaceous mass, which it was, in fact, found to be on this side, when examined from the interior. Upon the right side there was a wound through the skin, corresponding to the rounded margin of the *pass squamosa*. The *conjunctivæ* of both eyes were not in the least ecchymosed, and there was no swelling to be seen, either on the eyelids or on the rest of the head; from which we concluded that death must have been instantaneous; and this was afterwards found to have been the case, the unfortunate man having fallen dead without even giving vent to a cry. After removing the scalp, the entire upper portion of the skull seemed as if cut off and separated circularly, fissures also extending towards the occipital bone. The squamous portion of the temporal bone on the left side was split off, and there was a fearful destruction of the base of the skull, which was broken into innumerable pieces. The right hemisphere of the brain was completely smashed, as we have already said, and on the left side the *dura mater* was completely torn through. The ventricles were filled with *firmly-coagulated black blood,* and *similar coagula* lay in the internal fossæ of the skull, affording thereby another proof that the blood does coagulate after death (*Vid.* p. 23). In this case, also, the sharp division of the bones of the skull was somewhat remarkable, seeing that the body inflicting the injury was blunt. I have not, however, been able to learn whether the valves of the drawbridge were, as might have been expected, shod with iron, and perhaps acutely angled. Possibly, however, there was some unusual brittleness about the cranial bones in this case; they were certainly unusually thick, and measured, at least at their posterior half, one quarter of an inch in thickness.

Case XCIX.—Rare Fracture from the fall of a wall.

Both condyles of the right femur of a healthy young workman, aged 19, were completely broken off by the sudden fall of a wall; the rest of the body was uninjured. Unhealthy suppuration of the right knee-joint set in, accompanied by gangrene of the external wound, and the wounded man died after an illness of three weeks.

Cases C. and CI.—Fracture of the Skull; Cerebral Suppuration from the blows of a windmill sail.

(C.) A girl, aged 4 years, was struck by the sail of a windmill, became immediately insensible, with convulsions on the left side, and died in twenty-two hours. One-half of the coronal suture was separated to the extent of one line,—a most uncommon occurrence,—and one which, *like every other disruption of cranial sutures*, permitted the assumption of the previous employment of some *quite unusual violence*, and from the end of this fissure another one extended for three inches diagonally into the parietal bone. On the right parietal bone, towards its junction with the wing of the sphenoid, and with the squamous portion of the temporal bones, there was a fracture, with depression, about the size of a shilling. The brain unfortunately ran out after the skull was opened as a putrid pulpy mass, and could not therefore be properly examined. At the base of the skull a fissure extended from the point just mentioned right through the right wing of the sphenoid and across the *sella turcica*, the latter bone also being only fractured by the application of the *most extraordinary violence*.

(CI.) In this case, a boy, three years old, was struck by the sail of a windmill. We obtained no history of the case, inasmuch as no medico-legal report was subsequently required, and therefore can say nothing about it. At the dissection we learned that the child had lived seventeen days, a sufficiently striking circumstance, when we consider the appearances discovered. Externally there was little visible. On the left parietal bone, towards the vertex, there was an irregular four-cornered wound, with unequal sides, through which cerebral matter welled out. On the internal surface of the parietal bone, however, there was at this spot a stellated fracture, the termi-

nal points of which penetrated the *dura mater*. After its removal there was a gush of green purulent matter, and it now appeared that two-thirds of the whole of the left cerebral hemisphere were transformed into an abscess. We have quoted this case in connection with the foregoing, notwithstanding that it does not properly belong to the category of deaths from mechanical injuries, because injuries from windmills are so extremely rare. Obviously, the child had not been struck with the full force of the windmill sail, but had received but a (comparatively) slight blow, so that the case more properly belongs to the category of contused wounds.

CASE CII.—FATAL CRANIAL INJURY FROM A FALL DOWNSTAIRS.

This case, besides its forenso-anatomical interest, possesses also some degree of psychological interest, inasmuch as the unfortunate man was overtaken by death in a more than usually unexpected manner, immediately after indulgence in sensual pleasures of a kind betokening the fullest enjoyment of life. A staff-officer, just 53 years old, and in the possession of a pension, had drawn his allowance on the first of the month, and after having had a jollification, he proceeded to follow up his offerings to Bacchus with a sacrifice to Venus also. On leaving his priestess, he fell downstairs, and was dead within an hour! We found a fissure extending from the lambdoidal suture into the left *foramen lacerum*, and which gave rise to a precisely similar hæmorrhage to that which we have described as existing in Case LXXXVIII., for the whole of the cerebrum and cerebellum were covered with a layer of dark venous half-coagulated blood, one line thick. There was a remarkable extravasation of similar blood in the centre of the *pons Varolii*. Both sides of the heart contained a fair amount of blood. The stomach was filled with the remains of food stained with red wine. The bladder in this case also rose above the pubis, and was distended, as in other similar cases, with pale, watery urine.

CASE CIII.—RUPTURE OF THE SPLEEN FROM A FALL DOWNSTAIRS.

A boy, aged 5 years, was thrown down but a few steps by

another boy with all his force, and in five hours he was dead. The cause of death was a longitudinal laceration of the spleen that had completely divided it in two. There was *no trace* of external ecchymosis on the body!

Case CIV.—Fatal Cranial Injury from a fall.

It is something quite unusual to find the base of the skull fissured subsequent to a fall from an inconsiderable height, yet this we found in the case of a woman, aged 52, who fell from a cupboard, and died in twenty-six hours. Externally there was nothing remarkable. On removing the skull-cap, however, a triangular fissure was found in the right temporal bone, one leg of which passed across the base of the skull through the *sella turcica* quite to the opposite side. Above the *dura mater* and covering the whole of the left hemisphere, there lay a coagulum of dark blood half-an-inch thick. The *pia mater* itself was anæmic, but in the substance of both hemispheres, close to the lateral ventricles, there was an extravasation of dark blood of about four drachms (imp.) in weight. There was also in the fourth ventricle an extravasation the size of a pea.

Case CV.—Fatal Cranial Injury from a fall.

The following case, resembling the foregoing in the remarkable extent of injury, following a fall from a still more inconsiderable height, was easily explicable from the unusual thinness (only one line and a-half) of the cranial bones of the aged (70 years old) man. He fell on the floor of a room, and was taken up senseless and completely paralysed on the *left* side, and died in two days in the Hospital. The only trace of injury visible externally was a slight ecchymosis, the size of a plum, upon the external angle of the right eye. The squamous portion of the right temporal bone was fractured, the right parietal bone divided by five fissures, and upon the right hemisphere, over the *dura mater*, there lay an unusual quantity of pulpy, coagulated blood, three inches and a-half in thickness and about three ounces (imp.) in weight, which had made a groove-like depression on the brain. A smaller extravasation, weighing about two drachms (imp.) upon the *left side* of the base of the skull.

Case CVI.—Fracture of the Skull and Vertebræ, and Rupture of the Spinal Cord by a Fall from a Height.

A mason, aged 32, fell from a scaffolding four stories high, and died two days after. The results of this very considerable fall were a fissure an inch and a-half long, which extended from the right orbital plate of the frontal bone right into the *pass cribrosa* of the ethmoid, and a complete shattering of the ninth dorsal vertebra. Beneath this the *dura mater* of the cord was torn to the extent of one inch, and the spinal cord itself crushed and completely torn through. And yet this man lived two days!

Case CVII.—Murder by a Contused Wound of the Head.

Markendorf, at the time of the murder a young man just 18, went to a shoemaker of his acquaintance with the intention, as he afterwards confessed, of robbing him of a pair of boots at all hazards. The shoemaker sat upon a stool at his work. While conversing, M. slipped behind him, seized his hammer, and struck with a will and repeatedly upon his head; the unfortunate man fell from his seat stunned, and very soon thereafter died. The murderer subsequently confessed—what I have often heard from the mouths of such criminals (there seems to be some peculiar demoniacal pleasure in crime!)—that after giving the first stroke with the hammer, and with his victim already lying motionless before him, he became quite furious, and felt as if he could keep on battering him "for ever." This confession entirely corresponded with what we found, viz., *four-and-twenty* individual injuries of the head, extending even to the face (eyes, nose, and cheeks). Amongst others, the left ear was entirely separated, all except a narrow connecting band, by a transverse wound, with obtusely incised edges; there were also several such wounds on the soft parts of the head; and from this we, at the medico-legal dissection, where the nature of the deed and its perpetrator were alike unknown, at once concluded that the deceased must have been killed with a blunt (corresponding with most of the wounds), but also with an obtusely sharp, weapon. This supposition was afterwards confirmed by the confession of the murderer, who acknowledged having used both sides of the shoemaker's hammer alternately. It would be most wearisome and superfluous to

enumerate all the individual injuries which were found at the dissection; we content ourselves with recapitulating the most important, which were, a vertical fracture of the left, and a semilunar fracture of the right temporal bones, through their respective squamous portions, and also a complete fracture of the base of the skull, right across from one wing of the sphenoid to the other. The veins of the *pia mater*, especially on the left side, were distended with dark-coloured blood. Opposite to the fracture of the left temporal bone there was an extravasation of blood the size of a threepenny-piece, and a penetrating wound of the brain one-quarter of an inch in depth.

Case CVIII.—Complete Shattering of the Skull by a blow with an axe.

The following fearful case was also equally easily decided. A man, aged 60, whose mental condition, when subsequently examined, was found to be defective (imbecile, in the Common Law sense of the term), and who was consequently declared by us to be irresponsible, had allowed the idea, that he must die by the hangman's hands, to become fast rooted in his mind, and in order to attain this wished-for end, he had resolved upon killing a boy aged 12, who was in the habit of assisting him in his labours, and for whom he always had a certain amount of love and attachment! He invited the boy to come to him one Saturday afternoon on the pretence of assisting him to cut wood in the cellar. He had previously in this very cellar scattered some dominoes about the chopping-block, that the boy might be induced to stoop for them; and while in that position he intended to strike him dead with an axe. This plan was exactly carried out. Having come into the cellar, the boy stooped to pick up the dominoes, and at that instant, E.—paralytic on the right side — smashed his skull with the axe which he held in his left hand; whereupon he went at once to the police, and with the utmost composure disclosed his deed, requesting that he might be executed as speedily as possible! The wounded boy was immediately carried to the surgical hospital, but died on the way. The upper part of the skull was smashed; no fewer than eight large and small pieces of the left parietal bone, from the size of an almond to a crown-piece, were found lying *loose* upon the *dura mater*, which is an exceedingly rare occurrence. One of these frag-

ments had penetrated the *dura mater*. The frontal bone was completely split by a fracture running diagonally across it. The surface of the brain was, as it were, strewn with numerous extravasations of coagulated blood, and the hollows between the convolutions were filled with blood. In the posterior third of the left hemisphere the extravasation extended throughout the whole substance of the brain. At the base of the skull there was a fissure two inches long in the left great wing of the sphenoid, and a second fissure had split the occipital bone to its basilar portion.

In accordance with our opinion of the mental condition of the murderer, as expressed in our extended report, he was not executed, but sent to an asylum.

§ 9. Suicide or Homicide?

Whenever the question arises :—Has the deceased died by his own hand—suicide or carelessness—or by the hand of another? there are three criteria upon which a decision may be based, which is sometimes quite easily arrived at, but in many cases is extremely difficult. The decision may be based upon facts which are quite exterior to the body, and which involve the exercise of a sound judgment—which is of far more value in medico-legal matters than all the subtleties of the ancient *medicina forensis*. The facts I allude to are oral or written communications made by the deceased, from which his design to commit suicide may be gathered,* the fact of the body being found in a room locked on the inside, &c. We may rationally conclude that the case has been one of suicide, when it is known that the deceased has lived in any of those social conditions which experience teaches us often lead to suicide; there are also hundreds of circumstances occurring in individual cases, which it is impossible to enumerate collectively, which make a rational decision more or less easy (*Vide* Illustrative Cases), by which it is of course understood that the results of the dissection support the decision arrived at, and do not afford any indications contrary to it. Thirdly, however, the results of the dissection itself, taken into connection with the posture and position in which the body was found, even the nature and appearance of the clothing, the weapons which may have been found by the deceased, the body in short, as such, with all its

* The very remarkable case, CCLXXXIV., shows how even written communications of this character may be involved in doubt.

accessories of place, &c., will always afford the most conclusive evidence on which to base our judgment.

Whenever the question arises:—Has such an one who has perished from a fatal mechanical injury, perished from accident, suicide, or the fault of a third party? no single, generally applicable proposition can be laid down, except that fatal contused wounds permit the conclusion to be drawn, that the death has been caused by a third party, with a probability so great, as almost to amount to certainty. For experience teaches us (notwithstanding the uncommon rarity of such cases in the entire literature of the science), that men almost never (as we can easily understand!) choose this most uncertain and impracticable mode of committing suicide. I, myself, have never seen a case of the kind. In regard to the other kinds of fatal mechanical violence alluded to in this chapter, each individual case must be decided on its own merits. For example, at that part of the railway on which a shattered corpse was found, a lofty barrier, or other fence, had to be surmounted to gain the railway, and in such a case, therefore, no one could hesitate to regard the case as one of suicide. It is more difficult to decide in the case of falls from a height, downstairs, &c., and in such cases, the accused not infrequently declares that the deceased had fallen by chance, and without any complicity on his part. Should the peculiarities of the case render it impossible to give an indubitably certain decision, it is better openly to declare our incompetence, or to confine ourselves to tenable probabilities, rather than assume a certainty for the one case or the other, for which we have no scientific basis. The accused in fatal cases of violence often resort to the silliest subterfuges in the way of statements and descriptions of how the deceased has been killed by accident, or by his own fault—never by the fault of another; and of this, Case LVIII., already detailed, affords a most striking example, showing also how the appearances on dissection can controvert the most daring and obstinate lying.—We have also to consider the questions of suicide, accident, or murder, in respect of every particular kind of violent death, and since many circumstances which have more particular reference to one kind of death, require to be considered in all, to avoid repetitions, we beg now to refer to §§ 14, 23, 37, 42, 51, 57 and 62.

CHAPTER II.

DEATH FROM GUN-SHOT.

§ 10. The Gun-shot Wound.

We reckon this kind of death among the "mechanical," because, in most cases, it is caused exclusively or chiefly by destruction of the integrity of the external and internal organs involving that of the corporeal mechanism.* The diagnosis of this form of death is not difficult, since its effects are usually very evident. We have already (§ 37, Gen. Div.) considered the nature of the weapons employed, and have now to consider their effects. It is difficult or impossible to give a general description of a gun-shot wound, since no one such wound resembles another, as will be readily acknowledged by every one who has had any experience of them. In one case, we have such a mangling of the countenance that the body can be no longer thereby recognised; in another, there is nothing to be seen on the body except a small, insignificant wound, and that, too, in some out-of-the-way part of the body, such as the axilla or popliteal region. And yet both of these are gun-shot wounds. It is possible to lay down but few generally-applicable criteria in regard to such wounds, and, according to our experience, these few are the following:—Every gun-shot wound either traverses the whole body, and we have a wound of entrance and a wound of exit, or the shot does not pass through, but lodges. In such cases it is usually a most vain proceeding *to attempt to find* the ball, piece of lead, or shot in the body, even when such a solid projectile has been employed, which is by no means always the case. The piece of metal, or wadding, is most easily found in the skull, and when it has been impelled only by

* The ancient doctrines regarding the effects of *the wind of balls*, which were based upon not very trustworthy observations made upon fields of battle, &c., and have been long very generally doubted, have been proved to be perfectly false and untenable by Pelikan's very ingenious experiments. *Vid.* his Beiträge zur gerichtl. Medicin, Toxicologie and Pharmakodynamik. Würzburg, 1858, s. 151.

water or compressed air. It is difficult to find the projectile or wadding in the chest when the lungs have been much destroyed, and the pleural cavities are filled with masses of coagulated blood, and this is reduced to a bare chance in the case of the abdomen, where several organs are reduced to a bloody pultaceous mass. Every gun-shot wound *penetrates to some considerable relative depth ;* seldom or never do we find the extremity of the wound near its commencement in the case of the brain, lung, liver, or intestine, &c., but we almost always find the organ originally struck completely penetrated, which we can easily understand, from the violence of the gaseous expansion by which the bullet is impelled. Every gun-shot wound has, moreover, the peculiarity of *becoming larger the deeper it goes,* thereby differing from punctured wounds, &c. Should the ball lodge in any soft part, the cavity in which it is found is often from two to four times the diameter of the wound of entrance. And this is not contradicted by the fact that where a bullet has not lodged but has passed, along with the air or gas accompanying it, quite through the body, the *wound of exit* is always smaller than the *wound of entrance.* All recent observers agree in this opinion, which is quite opposed to that which was formerly the popular one, and they are right in so doing. These revolutionary years have afforded others, as well as ourselves, ample opportunities of studying such wounds!* Wounds from *double-shots,* as from double-barrelled pistols, &c., or from slugs or pellets out of one barrel, diverge after their entrance into the body, a fact easily recognised by the position of the wounds of exit when these are present, even where the condition of the wound internally does not permit the course of the projectiles to be traced. When the charge of shot has scattered before reaching the body, sometimes a few only, or perhaps but a single pellet, is found to have penetrated it, though the original charge has consisted of many such pellets. I cannot state the distance required to permit the charge to scatter, nor can I maintain that Lachese † is correct in assuming this to be three feet. In one of those unfortunate and too frequent cases, in which a girl was shot at in joke by her sweetheart with a gun supposed to be empty, but which was actually loaded with buckshot, it was ascertained that the man had stood six feet from the girl, and yet the charge was not scattered, and we found the whole of the left

* *Vid.* for observations on the Parisian street fights, and on the campaign in Baden, Buchner in the Prager Vierteljahrschrift, 1854, i. s. 38, &c.

† Annales d'Hyg., 1836, s. 386.

mamma pierced by numerous shot-holes. A charge of powder alone burns, contuses, and even lacerates the skin, when it has been fired close to the body. These points excepted, in which all gun-shot wounds agree, amongst a hundred different cases, we find every one different. The *wound of entrance* has its edges by no means always inverted, as all the text-books teach us, nor has the *wound of exit* its edges always everted, so that it can be thereby in dubious cases always discovered where the shot went in and where it came out. The condition of the edges of the wound depend upon certain other conditions, besides the entrance of the bullet; and of this I have been completely convinced by the observation of a large number of persons shot, respecting whose position at the moment of receiving the wound there would be no doubt, since they were all killed before witnesses during street riots or barricade fights. For instance, if the person wounded, or if the part struck be very fat, such as the abdominal coverings, &c., the fat soon protrudes from the wound, and it—the aperture of entrance—is found to have its edges swollen and anything but inverted. In other cases, and those of frequent occurrence in medico-legal practice, the putrefactive process causes the edges of both wounds—when two are present—to protrude, and so prevents their being recognised either as the aperture of entrance or exit. Moreover, the soft parts, both at the wound of entrance and of exit, are often so torn and mangled as completely to conceal the existence of any inversion or eversion of their edges. And there is still another peculiar case which of late has been of frequent occurrence, in which the diagnosis made from the state of the edges of the wound is perfectly deceptive—I refer to the case of wounds made by conical bullets. Their visible effect upon the surface of the body is usually perfectly different from that of round bullets, lead slugs, nails, stones, &c., for in such cases we only find a trifling, unecchymosed, slightly contused aperture, not always round, often more triangular, through which the conical bullet has entered, and from the appearance of which no one would for one instant suspect the amount of destruction which is to be found inside. Should the ball have passed through the body, the aperture of exit is precisely similar. This appearance is so constant, that it is by no means difficult after a little experience, to decide *à priori* with certainty that a conical bullet has been used. But just because of these appearances I would recommend the greatest caution in regard to the answers to any queries respecting the apertures of entrance and exit in the case of wounds with conical bullets.

§ 11. Continuation.

The shot produces either a sharply-defined round opening in the soft parts, or in the bones, as when it makes an opening in the skull like a trepan wound; this is, however but rarely observed; or it lacerates and shatters. Wounds of the first kind have been termed pure (?), those of the latter sort, usual gun-shot wounds; this is, however, a matter of no importance. Whether this difference in effect be produced, as it most probably is, by the loading or by the kind of weapon, I cannot say. It does not certainly result from *the distance* from which the shot has come, so that the appearance of the wound does not in this respect afford any means of diagnosis between murder and suicide (§ 14); independent of the fact, that in the case of the murder of one asleep (Case CX.), or quite near (Case CXXVI.), and in suicide, where the shot has been fired from some appreciable distance (Case CXXVIII.), those appearances dependant on distance may closely assimilate. Orfila, and after him Simon,* have expressed a different opinion—viz., that when the shot was fired quite close (within from sixty to eighty paces, according to Simon's observations in the campaign in Baden), and "when it came with great force," the apertures of entrance and of exit were precisely similar, and seemed as if they had been cut out with a punch. But here, again, we have considerable stress laid upon "the force" with which the shot struck; and my own observations compel me still to maintain the correctness of the opinions just laid down. When the shot, as is often the case, crushes and lacerates the parts at its entrance, then the edges are found irregularly torn and lacerated in every conceivable fashion, often with a considerable deficiency of skin at the aperture of entrance, and the subjacent hard parts completely shattered with jagged fissures streaming off in every direction, or whole portions of the body, the head, for example, may be partially or wholly blown off from the rest. The colour of the edges is susceptible of infinite variation. When the shot is not of such a character as of necessity to produce instant death, the edges are usually surrounded with a more or less broad border of ecchymosis, and are hard to cut. They are generally, but by no means always, more or less scorched, and then appear black as a coal and smeared with black blood. This colour is to be distinguished from the blackening produced by gunpowder itself,

* Buchner, *op. cit.*

inasmuch as it produces a larger or smaller number of patches covered with little greyish black dots. These scorchings and brandings with powder *only* prove that the shot has not come from any great distance, that is, as I have learned by observation in those cases in which it was possible to estimate it, from a distance not greater than from three to four feet. In cases, therefore, where suicide or murder is in question, these marks may, according to the individual circumstances of the case, either afford no proof at all, or, at the most can only furnish a probability, as, for example, when two men have been travelling together in one waggon, or have been wrestling with one another, and it has become matter of doubt whether the shot that has killed one of them has been fired by the other or not. In general, however, the complete absence of scorching or of powder branding from the edges of the wound permits us to assume with *some degree* of certainty that the shot has come from a considerable distance (more than four feet), and has therefore probably, or according to circumstances, with great probability, been fired by a third party, unless, as may happen in a few rare cases, there are facts to show that the suicide has made peculiar arrangements to shoot himself from a distance (as by means of a string fastened to the trigger, &c.). For experience teaches us that the whims of suicides are innumerable, and often lead them to the most fantastic proceedings. But, moreover, I cannot permit it to be assumed that the absence of scorching and powder branding is an *absolute* proof that the shot has come from a distance,—a doctrine that may be attended with the gravest results in important criminal cases, since I have missed both of these criteria from the edges of the wounds of persons who had indubitably shot themselves. One of the most recent of these was that of an instrument maker, who, as a letter in his pocket proved, had shot himself for slighted love. The body was found lying in the Thiergarten,* but no weapon near it. The charge, a piece of lead, apparently filed by himself to the shape of a conical bullet, had traversed the heart. The wound was of a remarkable, almost perfect triangular shape, its sides measuring one inch and a-half and one inch in length, and its edges were perfectly sharp, smooth, and perfectly unecchymosed, so that it resembled an incised much more than a gun-shot wound; not a single grain of powder was to be found branded on the edges of the wound, the neck or the face. If the shot have passed through articles of clothing before entering the body,

* A large public park close to Berlin.—TRANSL.

these are usually torn, and very often, from the elasticity of their textures, they display a smaller aperture than the wound in the body, or they may remain untorn, passing into the body as a pouch in front of the ball, which falls out when the cloth is pulled forward. Such cases are, however, but rare, while it is very common to find rags torn from the clothing lying with the bullet when its track is laid open in the body.* In regard *to the track of the ball,* this can in general only be followed and investigated when it has passed through dense and firm parts, such as the muscles of the extremities or back, the *nates,* &c. Its general direction can also be estimated when it passes through parts having a dense surface, as the head and face, thorax, &c. In the soft parts it is different. Among these the bullet track is most easily followed in the brain by carefully removing layer after layer, the track being easily recognised as a bloody pulp, passing in a certain direction through the healthy brain-substance. In the heart, also, it is sometimes possible to follow the track of the wound, but in general in such cases the heart is so completely disfigured as to render it impossible to discover the direction of the shot. This is also the case with the lungs in most instances, and also with the liver and spleen. When the shot has passed through the bowels, it is also extremely difficult to investigate its direction, and for this very reason, that the intestinal convolutions must be more or less altered in their position even to begin the inquiry, and the whole state of matters is thus necessarily changed. In all such cases a comparison of the orifice of entrance with that of exit, where it exits, affords often a basis whereon an opinion regarding the general directions of the wound may be based. At other times, and this right often, the bullet traverses the body in various directions, gliding off smooth surfaces, ricochetting from hard bones, &c., and finding its exit in some unexpected spot. And thereby are explained cases of the preservation of life after a gun-shot wound that trench on the marvellous, such as after the balls passing through the neck, which, however, did not, of course, pass through the trachea, carotid, &c., but only around them. Bégin's supposition that it is possible to distinguish the *cicatrix* of the aperture of entrance from that of exit seems an unusually rash one. He says that the cicatrix of the aperture of entrance is circular, concave, depressed, the skin equally plicated from the periphery towards the centre, also white and hardish, while that of the wound of exit is generally smaller, irregular in its interior

* *Vid:* the representations of gun-shot wounds, Plate II. Figs. 4, 5, and 6.

protruding, elevated, slit-shaped, or of various forms. It is, however, self-evident, that too many circumstances modify the formation of the cicatrix to permit such views to be regarded as founded on fact; moreover, the matter seems to be of very little importance in regard to medico-legal practice, since if any one wounded by a shot has lived long enough to have his wound cicatrized, he will probably be able to tell the Judge himself from what direction the shot came. Proofs in favour of all the assertions here made will be found in the illustrative cases, which will be given immediately.*

§ 12. Experiments on the dead body.

The result of my experiments on the dead body in regard to gunshot wounds could only be to make more complete the proof of the resistance of the dead corporeal tissues, in contradistinction to the same tissues when alive, after I had already learned this peculiarity from my experiments with contused wounds (§ 6, p. 244), and this peculiar resistant property was found to be confirmed in a most remarkable manner. Bullets, half-an-inch in diameter, fired from a common pistol against any bone, but particularly against the cheek-bone, from a distance of only from four to five feet, did not penetrate but rebounded, after contusing the soft parts. The same thing happened with slugs shot against a rib. A similar bullet was also fired from the same pistol against the side of the occiput of a male corpse. It penetrated, but remained sticking in the aperture, which it completely filled, as the stuffing does a hollow tooth—no trace of a fissure being found in the bone (which was of the usual thickness). How differently would a living bone have behaved if similarly wounded. A conical bullet fired from a distance of three feet against the abdomen of an adult covered with four folds of linen, did not succeed in completely traversing the body, but remained sticking in the muscles of the back. It had not carried any part of the linen with

* It is to be hoped that physicians without much experience in medico-legal matters, who are nevertheless frequently called upon at public trials to perform the part of "experts," and also that medical boards of reference, which do not always contain skilled medical jurists among their constituents, may be warned by the opinions given above, and founded on actual experience, to find no fault with medical inspectors, should they in certain cases declare themselves unable to make any decided statement regarding the direction of the bullet-track, in spite of the most careful investigation, or should they confess to not having found the bullet in the body, &c.

it into the body. A conical bullet, fired at the distance of six paces against the left side of the head of a man, aged 24, who had been drowned, broke up the cranial vault without destroying the scalp, and completely traversed the head, escaping at a point directly opposite its entrance. The track of the bullet could be distinctly traced through the brain, its substance being but slightly destroyed by its passage, of course without any effusion of blood. The wounds of the skin and bones had the characteristic form of those caused by conical projectiles, without any laceration or smashing, and of course without any discoloration of the edges of the wound. Another drowned person, was shot, at the same distance, with a round bullet from a double-barrelled gun between the third and fourth ribs. The wound of the skin looked as if cut out with a chisel. The track of the ball could be very distinctly traced, which it is quite impossible to do in the living body, from the extensive laceration of the soft parts. It had cut clean through the upper lobe of the left lung, then the aorta, the body of the fifth thoracic vertebra, the upper lobe of the right lung, and terminated in a somewhat less sharp-edged wound of exit on the right side. The track of the bullet could be traced as empty grooves through the brains of all the bodies shot through their heads, of course, because there was in these cases no effusion of blood to disturb the distinctness of the view. It does not need to be mentioned, that the edges of the wound in every case presented no appearance which could be mistaken for vital reaction. And for this reason, gun-shot wounds, even when purposely produced on dead bodies, can never for one instant be confounded with wounds similarly produced during life.

§ 13. Illustrative Cases.

Case CIX.—Gun-shot Wound of the Lung and Spinal Marrow.

The bullet which killed a deer-stealer, aged 38, took the following extraordinary course. It entered the left hand, followed the course of the *radius*, and penetrated the left shoulder. It shattered the first and second ribs, passed beneath the collar-bone without wounding the vessels, into the left thoracic cavity, lacerated the top of the left lung, traversed the body of the third thoracic vertebra, lacerating the anterior surface of the spinal cord, and finally passed

into the soft parts of the back, where it was found on dissecting the body.

Case CX.—Gun-shot wound of the Liver.

This case was more rare and remarkable in its psychological aspect than in its medico-legal one. Klebe, a journeyman mason, lived with a mistress, and suspected that his son, a lad of 21, the fruit of a former marriage, was too intimate with his sweetheart. He determined to revenge himself, and sought *to murder his own son from jealousy!!* The scene at the perpetration of the crime was such as the most luxuriant fancy could scarcely imagine. Here lay the son in the same bed with his younger brother, a little boy, round whom his arms were accidently thrown—there, in the darkness of the night, the father glides to the bed whereon his children sleep, a small lamp in one hand, a loaded pistol in the other; he bends over the boy that he may not hurt him, places the muzzle of the pistol just over the liver of his oldest son, pulls the trigger, and kills him on the spot! At the dissection the whole of the liver, except the *lobulus Spigelii*, was found so completely broken up that, along with the gall-bladder, it was transformed into a bloody pulp. Two pounds of dark fluid blood were effused into the peritoneal cavity. The bullet had traversed the liver, and also the internal edge of the spleen, and was lodged in the eighth dorsal vertebra, in which it was found sticking. The unnatural criminal was executed. While in confinement he made a great display (or pretence?) of penitence and piety!

Case CXI.—Gun-shot wound of the Omentum and Small Intestine.

A woman, aged 50, was accidentally shot at the ball-practising of the Citizen Militia. She stood about twenty paces distant from the place of firing; the musket-ball entered in the right hypogastric region, and made its way out posteriorly at the right border of the sacrum; and the woman lived two hours. The abdominal wound was protruded by the incipient putrefaction (not, therefore, inverted!), the edges, to the extent of a quarter of an inch, were irregularly ecchymosed; and, of course, from the distance at which the shot was fired, no powder marks were visible upon them. The edges of

the wound in the back were also protruded like those of the orifice of entrance, but they were not ecchymosed. The bullet had gone quite through the great omentum, and had torn a piece, three inches in size, out of the anterior wall of the ileum, close to its entrance into the cæcum,—appearances which sufficiently explained the presence of fæces, and of eight ounces of coagulated blood in the peritoneal cavity. The whole of the body was completely anæmic.

Cases CXII. and CXIII.—Fatal gun-shot wound of the Head.

At the well known assault upon the arsenal on the evening of the 14th of June, 1848, two of the assailants,—both of them from the lowest dregs of the people,—were shot dead by the City Militia. The one—a thief already convicted eleven times!—had three gun-shot wounds on his head; one, a lacerated wound, almost triangular, and one inch long, was situate over the right supra-orbital arch; half-an-inch above this was the second wound, also with lacerated edges, and the size of a fourpenny-piece; and the third one, one inch in diameter, was situate on the right parietal eminence, and from it there projected a piece of bone half-an-inch long. The whole of the skull was shattered, and the right cerebral hemisphere completely broken up. How could this extraordinary shot be explained? Only by supposing that the shot had been fired by a double-barrelled musket, both balls having entered through the wound in the parietal bone, and afterwards diverged, as such shots generally do, and escaped by two different openings anteriorly. This supposition of mine was afterwards confirmed by further investigation, which brought to light that only two shots had been fired upon that occasion, one of which had killed this man, and the other, ——, his worthy comrade, who was a journeyman shoemaker and barricade hero of 30 years of age. At the moment of the receipt of the fatal wound, he must have been calling out with open mouth (or perhaps been yawning), since the bullet had entered by the mouth and passed out at the right side of the neck, one inch from the spinous processes of the sixth and seventh cervical vertebræ, where there was a roundish lacerated wound with everted swollen edges. The tongue was torn to its centre, and hung in bloody tatters half-an-inch out of the

mouth. The teeth on the right side were amissing, and the whole of the under-jaw was shattered, *its external coverings remaining uninjured.* The ball had not injured the great vessels of the neck. The putrefaction, which was already considerably advanced, did not permit any exact examination of the brain to be made; but after removing the *dura mater* from the base of the skull, we found it completely shattered: the ethmoid bone, the petrous portion of the right temporal bone, the sphenoid and the occipital bones were all fractured. It is certainly remarkable that the ball, which in this case had passed beneath the cranium proper, had yet produced such extensive fractures of the true cranial bones.

Case CXIV.—Fatal gun-shot wound of the Head.

In this case the bullet lodged in the brain. It was a buckshot, with which a boy, aged 13, had been shot in the head. The bullet had entered through the centre of the left parietal bone, and had carried with it two small splinters of bone down to the left lateral ventricle, where they were found. The little bullet was discovered completely flattened, lying at the base of the cerebellum. From the shot-hole in the bone a denticulated fissure extended *in an exceedingly rare manner,* viz., *horizontally,* across the head towards the right, where it ended in the middle of the lambdoidal suture, while by far the largest number of fissures in the cranial bones follow a vertical direction. We also found in the basilar part of the occipital bone a piece of bone the size of a bean, broken out and lying loose in the rest of the osseous tissue.

Case CXV.—Fatal gun-shot wound of the Head from a conical bullet.

The following case was very similar to the last one, it was that of a boy aged 15, who acted as marker at target-practising, and was, through carelessness, shot in the head. The wound was situate in the scull-cap at the junction of the occipital and parietal bones on the right side, and appeared as a very irregular, partly circular and partly triangular, aperture, with flat, *not* inverted edges, which were feebly ecchymosed. Scorching was, of course, not to be expected (and was not found) since the shot had notoriously come from a

distance of 150 paces. A precisely similar aperture was found in the cranial bones, and close beneath it the conical bullet was found lodged in the protruding cerebral substance, with its base, strange to say, flattened out and, as it were, torn. The declaration of an eye-witness that the bullet had first struck a plank, and had been reflected from that to the boy's head, sufficiently explained the irregular appearance of the wound, and the trifling effect produced by the ball. The boy lived three days. The posterior half of the right cerebral hemisphere was completely transformed into a purulent pulp. The case was all the more interesting from the fact that the perpetrator of the deed was known to be one of two, one of whom used a conical and the other a round bullet, and the discovery of the conical bullet in the body revealed the true culprit.

Case CXVI. — Fatal gun-shot wound of the Head by a conical bullet.

This was a case very characteristic of the nature of a wound made by a conical bullet. The ball had entered on the right side of the neck, near the vertebræ, by a small triangular orifice, scarcely the size of a threepenny-piece, the edges of which were slightly inverted and ecchymosed to the distance of about two lines. The aperture of exit was situate on the right cheek in front of the ear, and appeared as a triangular wound half-an-inch long, with edges ecchymosed for about a line's breadth, and not everted. The whole of the base of the brain was bathed in black coagulated blood. The petrous portion of the right temporal bone was fractured, zigzag fissures running from this point into the occipital bone.

Case CXVII.—Fatal gun-shot wound of the Head with a conical bullet.

This was the case of a canal labourer, named S., aged 21, who was shot through the head during the riot on the 16th of October, 1848. In the middle of the right cheek there was an irregular, roundish wound, about the size of a halfpenny, with hard, dry edges, burnt for about half-an-inch all round—whence it was to be gathered that the muzzle of the piece could have been but a few feet distant (*Vid.* § 11); and through this opening one could look into the *antrum Highmori*. The aperture of exit was at the right mastoid process, and was a

triangular wound, with soft unecchymosed edges. The whole of the right side of the skull was shattered, and particularly the right great wing of the sphenoid, the temporal bone with its petrous portion and part of the occipital bone. The base of the brain and the cerebellum were bathed in dark blood coagula.

Case CXVIII.—Gun-shot wound of the Popliteal Vein.

At another target practice of the City Militia, a boy, 12 years old, standing by the target, was shot dead. In this case the death was caused purely by hæmorrhage, and this from the popliteal vein. The ball had passed beneath the knee-joint from within outwards, without injuring the joint, and had made a tear three-quarters of an inch long in the posterior wall of the popliteal vein. The aperture of entrance was circular, its edges sharp, smooth, dry, ecchymosed, and somewhat inverted. The aperture of exit was somewhat smaller, its edges lacerated and everted. The bullet track was stuffed with coagulated blood. That the hæmorrhage in this case must have been considerable, and truly fatal, was sufficiently evinced by the complete anæmia of the whole body, which in this case even affected the cerebral veins; and this, as I shall by-and-by show, is by no means always the case in cases of death from hæmorrhage (§ 21, Spec. Div.).

Case CXIX.—Gun-shot wound of the Heart and Lungs.

At the canal labourers' riot at Berlin on the 16th of October, 1848, by an unlucky chance, an unconcerned watchman, who sat composedly in his box upon the field of battle, was shot through the chest; the bullet passed over the *manubrium sterni* into the chest, where it lodged. The heart was torn to pieces, and the superior lobe of the left lung was partially lacerated, and of course there was an enormous effusion of blood into the cavity of the pleura. The ball had not passed out of the body, yet it could not be found amid the mass of blood coagula.

Case CXX.—Gun-shot wound of the Vena Cava.

The following six cases also take their origin from the same canal labourers' riot; they comprise a journeyman mason, two journeymen tailors, a whilom publican, a day-labourer, and an unknown

workman. In the case of T., there were three pounds of half-coagulated blood in the peritoneal cavity, which had come from a wound of the *vena cava.* The orifice of entrance was over the crest of the left ileum, and its edges were ecchymosed for two lines in breadth. In this, not only was the ball not found, although, as it had not passed out, it must have been lodging in the body, but even a probe which was stuck into the track of the bullet to point out its course also disappeared—the like I have seen in two other cases,—and it had to be sought for long in the abdominal cavity before it could be found.

Case CXXI.—Gun-shot wound of the Arch of the Aorta and of the Lungs.

In C., aged 18 years, the bullet had entered between the second and third ribs on the left side, and passed out at the right shoulder-blade. Remarkably enough, the ball, without wounding the left lung, had penetrated the arch of the aorta, making in it an orifice the size of a threepenny-piece, whose edges were not ecchymosed, it then traversed the upper lobe of the right lung, two-thirds of which it had completely lacerated. In the right cavity of the pleura there were ten, in the left three ounces of dark fluid blood. In this case, also, of sudden death from hæmorrhage, the cerebral veins were by no means empty.

Case CXXII.—Gun-shot wound of the Diaphragm and Lung.

In this case the appearances were most unusual! Externally, the aperture of entrance (with inverted edges, hard to cut, and ecchymosed for the breadth of two lines) was visible between the fifth and sixth ribs on the right side. On laying open the thorax, the liver was the first thing that caught the eye, its convexity projecting into the cavity. Of course, the diaphragm must have been injured, and, in fact, it was found torn right across its right half. The inferior lobe of the right lung was also lacerated by the bullet, the direction of its track was therefore easily inferred. There was nothing else injured.

Case .CXXIII.—Wound of the Lung and Vena Cava by a conical bullet.

A most characteristic wound by a conical bullet had proved fatal to a canal labourer. The only injury visible on the entire body was an orifice the size of a pea at the internal part of the right arm, with edges blue and ecchymosed for the breadth of two lines. This little wound was only discovered after repeated careful but fruitless examination of the whole body for an injury, and might very readily have been overlooked, particularly if the body of the presumed victim of accident or suicide had been only inspected by a legal functionary. The bullet had passed into the chest, had penetrated the upper lobe of the right lung, and lacerated the vena cava. We could not find the bullet amidst such a mass of blood coagula (eighteen ounces in weight). The following was a similar case:—

Case CXXIV.—Gun-shot wound of the Heart and Lung.

The bullet had entered between the sixth and seventh ribs. The wound was irregular, roundish, half-an-inch in diameter, apparently caused by a common musket (ball and not a conical) bullet; its edges were not inverted, but were irregular, hard, and surrounded with a dark-red ecchymosis the breadth of two lines. The internal wound was not ecchymosed. In the left pleural cavity there were four, and in the right one twenty ounces of dark coagulated blood. The ball had passed through the inferior lobe of the left lung into the pericardium, had completely lacerated the left ventricle of the heart, and finally penetrated the inferior lobe of the right lung, in which it remained implanted.

Case CXXV.—Gun-shot wound of the Lung and Femoral Artery.

This man had been twice shot. One bullet had lacerated the femoral artery about the middle of the right thigh, and another had apparently passed in by a wound about the size of a shilling, with dark-red ecchymosed edges, situate over the left acromion, out of which protruded the splintered collar-bone. The orifice of exit,

situate at the upper edge of the left shoulder-blade, resembled the wound of entrance, only it was smaller, and had everted edges. The ball had passed through the top of the superior lobe of the lung, and had broken off the left transverse process from the first thoracic vertebra, and shattered its body. Withal, it was somewhat remarkable to find *only* three ounces of clear fluid blood in the left pleural cavity, whilst in general much more considerable effusions of blood are found in cases of penetrating wounds of the lungs, as the foregoing cases have exemplified. But the whole body was anæmic, and the fatal hæmorrhage had evidently taken place from the femoral artery, and at an earlier period than that from the lung. Had both of these shots been fired with criminal intent by two different persons, the case would have given rise to most interesting legal questions, since, according to the appearances on the dissection, the (of itself unquestionably fatal) wound in the chest *did not kill*, but had only been inflicted upon a man already mortally wounded.

Case CXXVI.—Murder by a gun-shot wound of the Diaphragm.

According, as it was alleged, to previous agreement, a journeyman silkweaver, shot his sweetheart (one hot August), by placing a double-barrelled pistol, each barrel of which had been loaded with half a bullet, upon the region of her heart and firing off one barrel. He then endeavoured to shoot himself with the other barrel, but the bullet was caught in it. His sweetheart, still living, called on him to stab himself, which he attempted to do with a bread-knife and two razors, but in vain. The girl, still living, exhorted him to hang himself! and he tried to do this with a towel fastened on a doorlatch. He became insensible, was seized, imprisoned, and condemned to be executed, this being afterwards commuted to imprisonment. The body of the girl was, alas! only three days after her death already green from putrefaction; between the seventh and the eighth ribs on the left side there was a large opening out of which the stomach protruded, in size like a child's head, but in so disorganized a state that in attempting to replace it it burst. The external wound was two inches long and one inch in width, with edges slightly inverted, dry, unecchymosed, and on which there were visible here and there dark-grey points (powder marks). Both ribs were uninjured, as also both lungs, which were anæmic. In the left pleural cavity there were

four, in the right two ounces of a dark, half fluid, half coagulated blood. The heart and large blood-vessels were uninjured, but not so the diaphragm, the entire left half of which was irregularly torn, with strongly ecchymosed edges. Through this rent the distended stomach had protruded. Besides the rupture which took place at the dissection, there was also another round, sharp-edged, unecchymosed opening two inches in diameter, situate in the anterior wall of the stomach. The rest of the abdominal organs were uninjured. Though it was not, as is evident, difficult to form an opinion regarding the nature of the case, yet the ball could not be found in the abdominal cavity.*

§ 14. Suicide or Homicide?

Besides what we have already said (§ 9, p. 263) in relation to this question in general, the following points still remain to be considered in regard to death by firearms.

(1.) The *position of the body*.—I cannot concede that the supine position of a body found shot points with certainty to suicide, as many authors assert, any more than that men shot by others, as soldiers in battle, or those thus executed, always fall forwards, since I have known many cases of indubitable suicide in which the bodies were found lying on their bellies. The medical jurist is not usually present at the discovery and removal of the body, which is generally given to him for examination at a later period; in regard to this point, therefore, I possess no considerable experience. I have had more frequent occasion to see the bodies of those who have died from cutting their throats, than of those who have shot themselves, lying on the place and in the position in which they have died. I have found these bodies, no doubt, usually lying on their backs, but frequently also on their bellies. This variety in position seemed to depend upon that in which the person had been at the moment in which he gave himself the fatal wound; † these various observations at

* *Vide* cases of gun-shot wound in the axillary artery, p. 65; in the spinal marrow, p. 123; and in the lungs, p. 123.

† I have learned officially, that staff-surgeon, Dr. Wolff, saw in Dantzic, of four cases of suicide by firearms (soldiers), to which he was called immediately after the commission of the deed, two of them lying on their bellies. Both of these had shot themselves, *standing*, with the (Prussian) needle-musket. The other two had shot themselves with the same weapon while *sitting* upon the edge of a bed; these were found lying on their backs.

any rate justify the assumption of the dogma: THAT NO CONCLUSION AS TO THE SUICIDAL OR HOMICIDAL NATURE OF THE CASE CAN BE DRAWN FROM THE POSITION IN WHICH THE BODY SHOT HAS BEEN FOUND.

(2.) The *discovery or not of the weapon* near the body proves nothing, as every one knows, since it is just as likely to be stolen from the dead suicide, and so to be not found beside him, as happens with us very frequently, where the bodies are lying in the open air with good useful pistols beside them, as it is to be intentionally left near his victim by the murderer, with the design of obscuring the traces of his crime. Most extraordinary complications do, moreover, occur, as we will find, for instance, in Case CXXXVI., in which a pistol *loaded with ball,* was found lying beside a man shot dead through the heart. In a more recent case, two double-barrelled pistols, one of them burst, were found lying by the body, whereof *three barrels* had been fired. This man, aged 40, had shot himself immediately after his arrival in one of our hotels. One charge was found to have taken effect in the left hypogastric region; out of the wound a convolution of the large intestine protruded; a second one had made a wound in the umbilical region, and a third one, evidently the last, had penetrated the forehead and smashed the skull. Should the weapon be found, very often some degree of probability may be attained by its simple inspection. For instance, in cases of suicide occurring amongst the lower and poorer classes, we often find near the body old and useless pistols, or a gun-barrel merely, or some kind of firearm extemporised for the purpose, such as a third party would scarcely have used with intent to kill; this is a matter not hitherto taken notice of, and I can recommend it as deserving of attention. Should the gun so found be burst, that of itself gives a certain air of probability to the idea of suicide; since suicides are fond of overloading the weapons employed, to make more certain of their end, and often also from ignorance load them badly. All authors recommend you also to compare the bullet that has caused the death with the bore of the weapon found. It does not appear, however, why this comparison should be undertaken, since a murderer will scarcely intentionally place any other weapon than the one employed near the body! Moreover, in order to institute this comparison, it is necessary first to find the bullet. But when this has passed through the body we cannot of course find it, and we have already stated (p. 265) that it is not always possible to do so,

even when we know that it is in the body. Finally, the comparison is not possible when small shot, buckshot, or lead slugs, &c., are used, which will pass into any barrel, or when the bullet has lost its original form by striking against hard bodies, since to beat it right again, as Bock advises, and then compare it with the bore of the presumed weapon, is a most unsafe experiment, and one against which the advocate of the person accused might most justly protest. We have already spoken of the investigation of the fouling of the gun-barrel and of Boutigney's experiments on this point, and have shown their insufficiency (§ 37, p. 135).

(3.) The examination of the hands, particularly in most cases of the right hand of the corpse, is not nearly so often as it is supposed of any use in determining this knotty point, but may certainly be of the most decided importance, such as when the pistol, &c., is found so spasmodically grasped that the fingers must be sawn through to liberate it, a most infallible sign of suicide, since no third party can by any means produce such a closure of the hand of a corpse.

Kussmaul * indeed supposes the contrary, and holds the spasmodic closure of the hand to be the result of cadaveric stiffening, supposing that if a pistol were placed in the hand of a corpse before the occurrence of the rigor mortis, its fingers would on the occurrence of this rigor "grasp it so firmly that it would cost some trouble to remove it." Repeated experiments made on the dead body for the purpose of investigating the truth of this assertion, have convinced me of its error. We placed in the hands of bodies, lying in the dead-house, immediately after death, at least before the occurrence of cadaveric rigor, round pieces of wood, such as pistol handles and the like; in other cases we bent the fingers and wrapped the entire hand (holding the body) with a piece of cloth, and finally, we fastened the fingers firmly round the wood with pieces of plaster, and waited the occurrence of the rigor. In every case, without a single exception, the instrument was with the utmost ease removed from the fingers which seemed to clutch it. The spasmodic grasping of the weapon, therefore, continues to be a most exquisite proof of suicide. It is, alas! one of the rarest phenomena. Next to this is the discovery of fractures of the fingers, or recent cuticular abrasions on the hands of the corpse, which may certainly supplement the evidence of suicide; but it must also be remembered, that such injuries may be otherwise produced; and this reflection may deserve

* Prager Vierteljahrschrift, 1856, 50 Bd. s. 113.

the gravest consideration in important cases, where from other circumstances there is forced upon us the suspicion of an antecedent struggle with a murderer.

Much importance has been laid upon finding the hand of the corpse blackened.

Should this really depend upon branding with powder, the question might still arise,—Has this not arisen from some previous shot, and, in spite of this, may not the deceased have been shot by some third party? Such a doubt may perhaps appear well founded in certain individual cases, but in general this sign is really demonstrative of suicide. Only to make sure that we do not take the dirty hand of a metal worker (*Vid.* Case CXXXIII.), for the fouling from powder, which it may strongly resemble, we must carefully wash it, when the metallic stains will wash off, while the powder-branding remains. Contrariwise, however, the absence of powder-branding proves nothing. For the suicide may have worn gloves when he shot himself, which have been afterwards removed, or in shooting himself he may not have used his hand at all, as happened in Case CXXVIII.; and, besides, even in flagrant cases of suicide, in most instances the hand is just as little blackened as it is in the case of soldiers, gamekeepers, &c., after firing their pieces. Scorching of the hand is, moreover, only likely to be produced by more or less unskilful handling of some firearm destitute of a percussion-cap. Injuries of the hand also do not happen to experienced shots, and only arise from awkwardness; and this explains what experience confirms, that in most indubitable cases of suicide by firearms there is *no remarkable* appearance found upon the hands. And we have now only to investigate—

(4.) *The direction of the wound,* which is frequently the only basis upon which the decision can be grounded, and before doing so I would beg to refer to the difficulties already enumerated in § 11. It is well enough known that such situations as are usually selected by suicides, from their certainty, such as the mouth, the temples, or the region of the heart, are sometimes chosen by murderers, to obscure their crime, and give it the appearance of self-murder. But the direction of the wound *may* be such as to exclude the possibility of suicide; for instance, should it tend from behind forwards, or from above downwards, or should it be a musket-ball which has penetrated the back of the head, &c.,—cases

which are, however, extremely rare. And so in regard to this circumstance also, each case must be judged of on its own merits. Should the wound be deep in the palate, where the muzzle of the pistol had been placed (as in Case CXXXI.); should the deceased have been destroyed by filling the mouth with powder and blowing it up (as in Case CXXXVIII.), no one would hesitate to assume the fact of suicide. Meanwhile, such a positive assertion is by no means always possible, since we have opposed to it all the manifold considerations we have just suggested. Still, we have just as little to say in this as in any other medico-legal matter, in favour of that too much affected subtle scepticism which leads men in ninety-nine out of a hundred cases of death from gun-shot wounds, to leave the Judge in perfect uncertainty, and against which the healthy human intellect rebels. Suicides take place daily, murders, fortunately, but rarely. Statistics, moreover, inform us that male suicides prefer shooting themselves to any other form of death but hanging, and, also, that accidental death from the incautious use of firearms is extremely frequent in the case of soldiers, foresters, gamekeepers, and the like. From all this it follows that in any doubtful case the probability in favour of suicide is *à priori* much greater than that of murder. The medical jurist must, therefore, seek so to express his opinion as to give the Judge a firm basis, according to which to treat the case, without wounding his own conscience, or excluding the possibility of further light being thrown on the case by future investigations. Such a mode of expression as we—we repeat it—are daily in the habit of satisfactorily employing where the case does not admit of an unqualified "yes" or "no," such, for instance, as "that the dissection with (according to circumstances, 'great,' or 'very great') probability favours the idea of 'suicide,'" or "that the dissection has not revealed anything inconsistent with the idea that the deceased has died from suicide (or accident)." In a very large number of cases of death from violence, in which we have delivered our opinion thus, and in which there were no other judicial grounds for suspicion, the case was quashed by the dissection, and the documents reponed; whilst, by permitting an unjustifiable scepticism, so to word the medical opinion, as, *e.g.* "that the dissection affords no means of deciding whether the deceased has died by his own hand or that of another," the Judge would be necessitated, in order to enable him to act one way or another, to refer the matter to the costly and

tedious decision of the technical courts, to keep a suspected but actually innocent person long in prison, and after all this disagreeable delay obtain only the satisfaction of reponing the documentary evidence.

§ 15. Illustrative Cases.

Case CXXVII.—Murder by gun-shot wound of the Thoracic Portion of the Right Jugular Vein and of the Lung.

The perpetrator of this deed confessed immediately after he had done it, that he had shot his sweetheart, who had scorned him, and who stood right before him, by firing at her two pistols loaded with buckshot, the charge from one of them having injured the abdominal coverings, while that of the other had penetrated the chest. The hæmorrhage was but trifling, and I was accidentally enabled to verify this fact about half-an-hour after the commission of the deed. The girl died in five days. Although the shot had been fired quite close, yet the wound in the chest, which was right upon the *manubrium sterni*, and was half-an-inch in diameter, had its edges blackened, indeed, but not ecchymosed. On the other hand, the closeness of the shot was evinced even before the confession of the perpetrator, by the numerous grains of powder branded over the whole of the left cheek. The anterior portion of the *vena jugularis thoracica* was found to have irregular openings in it. At the apex of the superior lobe of the right lung, there were two circular wounds, the size of the buckshot produced. Both had traversed the whole of the lung, and so diverged (p. 266), that the inferior wounds were three-quarters of an inch apart. The two buckshot were found lying on the right side of the diaphragm. The right pleural cavity contained about one ounce and a-half of dark fluid blood. All the other organs of this young and healthy girl were uninjured—only anæmic. The case was an easy one to decide. The perpetrator was condemned to death, but this was graciously commuted to penal servitude for life.

Case CXXVIII.—Suicide from gun-shot wound of the Left Lung.

A young man, studying medicine here, had, after suffering long from melancholy, determined to kill himself. He placed a perfectly

new double-barrelled pistol, both barrels loaded, at the foot of a sofa-table, tied a piece of match to the end of a cane, then laid himself down upon the sofa, with the upper part of his body well forward so as to favour the entrance of the ball into his heart, lighted the match and fired the powder in the priming pan. He so far failed in his intent, however, the bullets missing the heart, but lacerating the left lung, diverging to different points of exit in the back, and lodging in the soft sofa pillow, where we found them. The unfortunate young man lived for five hours, so the method of procedure was accurately ascertained. Of course, in this extraordinary case, the hands were neither blackened nor injured, &c.

Case CXXIX.—Doubtful Suicide.—Gun-shot wound of the Diaphragm and Spleen.

Another most extraordinary case. A man, aged 48, was found in the water in January, clothed, and dead. His coat and top-coat were *buttoned up to the throat,* his clothes and shirt uninjured. The police never doubted but that the body was that of a drowned person, and their astonishment may be imagined when, upon unclothing it, a gun-shot wound was found in the region of the heart! At the dissection it was found that the shot had passed through the diaphragm and spleen, and had lodged in the muscles close to the vertebral column. The lungs were healthy, and contained no water, the trachea but a little bloody froth, the right side of the heart was distended, the left empty; the left pleural cavity contained a cupful and a-half of blood, the tongue was between the teeth. In the head there was great congestion of all the veins and sinuses, in the stomach a cupful of dirty water; the rest of the body was perfectly normal—if we except its unusual obesity. In the early morning those living in the house near the pond had heard the dogs barking, and from a spot not far from the pond, where the snow was considerably disturbed, footsteps could be distinctly traced to the pond itself. It is evident that this case was no easy one to decide. We gave it as our opinion that the gun-shot wound was absolutely mortal. But this absolutely mortal character of the wound did not by any means involve instantaneous death, and the wounded man might very well have walked a few steps to the neighbouring pond, where he might speedily die, and this view was supported by the existence in the body of several signs of death from drowning. As to the question of who did the deed? the man him-

self must be assumed to have done it, as the complete buttoning up of all the clothes can only be explained by supposing the case to be one of suicide, with a short interval of consciousness following the fatal shot. Since both the clothes and shirt were uninjured, a murderer must have shot his victim when naked, and in that case the completely clothed condition in which the body was found is perfectly inexplicable. Finally, the circumstance that the death had occurred from drowning before the gun-shot wound had time to develop its fatal effects, militated against the supposition of the co-operation of any third party. The fact of the pistol that had been used being found in the pocket of the coat upon the body could not be regarded as proof either way, since it was quite possible for a murderer to place it in the pocket and leave it there for the very purpose of exciting the suspicion of suicide. Other analogous cases of suicide also favoured our views; it was subsequently ascertained who the unknown man was (a stranger merchant), and then our opinion was completely confirmed by the circumstances.

Case CXXX.—Doubtful Suicide.—Fatal gun-shot wound of the Head.

A young man, aged 19, was found shot through the head, and whilst his watch was left in his pocket, the pistol with which the deed was done was awanting, and this brought the case under the cognizance of the law, and necessitated an examination of the body. The ball had entered about the middle of the forehead, where the soft parts were lacerated in the figure of the letter M. There was no branding with powder in the neighbourhood of the wound. The orifice of exit was in the occipital bone. The wound in the frontal bone was one inch in diameter, whilst that in the occipital bone scarcely admitted the point of the index finger. The whole of the cranial vault was blown off, being only firmly connected to the occipital bone for the extent of two inches. The whole of the surface of the brain was covered with blood, and its substance completely broken up. The circumstances connected with the case were in favour of suicide, and we gave it as our opinion that the dissection had revealed nothing inconsistent with this view.

Case CXXXI.—Doubtful Suicide.—Fatal gun-shot wound of the Head.

A powerful man, aged 35, was found shot dead. A most remarkable circumstance connected with this case was the universal existence over the whole body of a well-marked *cutis anserina*.* The direction of the wound was also most unusual; the ball had entered about the middle of the palate, where there was a sharply-defined circular opening; from the *pons Varolii* onwards, the track of the bullet through the brain could in this case be easily traced, inasmuch as little or no blood was effused into it. About the centre of the occipital bone there was a piece broken off about the size of a five-shilling piece, and directly beneath it lay two half bullets. There was nothing remarkable upon the hands, but the position of the wound of entrance was sufficient to stamp the case as one of suicide.

Case CXXXII.—Wound of the Heart and Lung by a conical bullet.

A journeyman locksmith had filed out for himself two tolerably rude conical bullets, and shot himself with one of them. The other was found in his pocket, along with a packet of powder. A recent and bleeding fracture of the *left* index finger, showed that he had shot himself with that hand. The wound on the breast had sharp edges, as wounds from conical bullets generally have, was acute-angled, four lines broad, its edges *not* inverted, and its circumference partly scorched and partly ecchymosed. The bullet had penetrated the pericardium, had torn the right ventricle and auricle to tatters, and, after wounding the right edge of the left lung, had penetrated the back, and was found sticking in its external coverings. The hæmorrhage was extremely trifling; there was only two ounces of blood in the pericardium.

Case CXXXIII.—Wound of the Heart and Spleen by a conical bullet.

On the body of a man, aged 30, one inch and a-half from the left nipple, there was a circular opening, one-quarter of an inch in diame-

* *Vid.* Death from Drowning, Chap. VI. § 54.

ter, with sharp, clean dry edges, neither swollen nor inverted, surrounded by a dark-coloured ring two inches broad, which was leathery, and not ecchymosed. The fingers were bent and stiff. The first phalanx of the left index fingers broken, and there was also beneath the fracture, on the anterior aspect, a bloody wound, the size of a pea. The palm of the hand was covered with dried blood. *Both* hands were greyish-black with dirt, which could be easily washed off. From this the trade of the deceased could be readily inferred, and it was accordingly found that he had been—a journeyman tinsmith. On the left half of the back, about three inches beneath the anterior wound, about two inches from the spinous process of the ninth dorsal vertebra, there was a semi-circular opening one-quarter of an inch in diameter, with sharp smooth unecchymosed edges, neither everted nor inverted, in short, a wound most characteristic of a conical bullet. If any one had taken a knife and cut a semicircular flap of skin on a dead body, the wound would have exactly resembled that now before us. At the dissection, the fifth rib was found broken beneath the anterior wound, where the shot had obviously entered. The whole of this region was infiltrated with coagulated blood—a further proof of the correctness of what we have already stated regarding the coagulation of the blood after death.* For death must in this case have been instantaneous, since the left ventricle displayed a rent an inch and a-half long with lacerated edges. In this ventricle there was still a small coagulum; the right ventricle, and all the large blood-vessels, were quite uninjured and empty. But the whole of the left pleura was completely filled with blood, partly fluid and partly coagulated. Both lungs were uninjured, but the ball, after traversing the heart and pericardium had penetrated through the diaphragm into the abdominal cavity, making a jagged lacerated wound in the upper edge of the spleen. The deceased had, therefore, shot himself with his left hand, the muzzle of the weapon having been placed upon the cardiac region, so that the conical ball had passed through the body from above downwards, and from before backwards.

Case CXXXIV.—Suicide by a gun-shot wound of the Head without a ball.

In the body of a man, aged 25, a circular aperture of entrance the size of a five-shilling piece was found in the right temple, but there was no aperture of exit. The soft parts were much mangled and

* Page 23.

covered with dried blood; the left temporal bone, as well as the right, blown loose, and the cranial basis fissured. The track of the wound traversed the brain horizontally, and close to the internal lamella of the left temporal bone there lay a paper plug the size of a hazel-nut, which had in this case been the only projectile used. The blood-stained right hand and arm, with distinct powder-branding on the fingers, left in this case no room to doubt its suicidal nature. The powder-branding was easily explained by the awkwardness of the operator, who had used an old, useless, little pocket-pistol, which he had evidently overloaded, since the barrel was burst. In this case, also, there was a distinct *cutis anserina* over the whole body.

Case CXXXV.—Doubtful Suicide.—Gun-shot wound of the Heart and one Lung.

A blind man, aged 52, was found sitting in his room by a warm stove, killed by a pistol-shot through the left breast. The external wound was three inches long and one inch and a-quarter wide, its edges lacerated, and for more than half-an-inch in circumference blackened and scorched. The ball had entered between the sixth and seventh rib, had completely lacerated the left lung, and so mangled the heart that the only portion recognisable was a part of the wall of the right ventricle. In the left pleural cavity there were eight ounces of dark fluid blood effused. The right lung was pale and quite anæmic, as well as the whole of the rest of the body, with the exception of the veins of the *pia mater*, which were still tolerably full. The back was perfectly covered with *post-mortem* staining. The case was remarkable. The deceased was quite blind, having two perfectly-developed cataracts. His family knew of no motives likely to lead to self-destruction. And they had also no suspicion where he had bought the pocket-pistol, which he did not formerly possess, and which was found near the body, nor even that he had procured one, neither was any ammunition found in his possession. Towards the close of his life (the autumn of 1848), he had been bitten by the political mania of the period, and had been every evening conducted to the clubs. It is at once evident that such scanty data were not sufficient to lead to the supposition of murder having been committed, and, moreover, the direction of the wound would not justify any such supposition. The examination of the hands led to no result. Both hands seemed by the candlelight—and the examination

was obliged to be conducted by artificial light—to be dirty-bluish-grey, and the fingers were flexed, but both were precisely alike. The shirt, however, had been pushed aside, and it as well as the dressing-gown were uninjured. These things seemed to bespeak a voluntary death; and yet it is possible, that a third party, finding the poor blind man, perhaps asleep, in his chair by the stove, might have shot him after this careful fashion, in order to give rise to the suspicion of suicide. In this state of matters we concluded our protocol of the dissection with the following summary opinion, "That the dissection has revealed nothing opposed to the opinion that the deceased has committed suicide." Further judicial inquiries ascertained the correctness of the assumption of suicide, and the case was not proceeded with. The following case was very similar, but more difficult.

Case CXXXVI.—Doubtful Suicide.—Gun-shot wound of the Heart.

In Frederick's Grove,* a man, aged 40, was found shot dead, and sitting upon a tree. His watch and purse, which he was known to have had with him, were awanting, and near him lay, certainly a most rare and singular occurrence, *a pistol loaded with ball.* The coat, &c., upon the body had been thrown open, the shirt was pierced by the shot, which had penetrated between the fourth and fifth ribs on the left side. Here we found a circular wound half-an-inch in diameter, with lacerated edges, which were neither everted nor inverted. For the circumference of two inches the skin was yellowish-brown and hard to cut; but there were no traces of powder-branding. In the left pleura there was an effusion of two pounds and a-half (imp.) of blood, partly fluid and partly coagulated, and the heart was completely shattered by the shot. In this case also, the most careful search failed to discover the ball, which had not passed out of the body. Both hands, as well as all the joints, were quite supple, and no trace of powder-branding was found upon the hands. Was this a case of murder or of suicide? The question which was put to us at the dissection was, "Could the deceased, after receipt of his fatal injury, have loaded the pistol again?"—for by this supposition, if true, the finding of the loaded pistol by the body would be explained. But, inasmuch, as death must have been instantaneous, we could have no hesitation in answering it negatively. It was

* The new park outside the gates of Berlin.

much more difficult, however, to decide as to the likelihood of suicide. The deceased *might* have been robbed, while drunk, of his watch and purse, and then shot dead, and the murderer might in this case have loaded the pistol anew and laid it designedly by the body. But this view of the case rendered the throwing back of the clothes somewhat remarkable. The deceased *might*, however, have shot himself, and to that end might have taken out with him two loaded pistols, one of which, with his watch and purse, had been stolen from him after death. The absence of blackening around the wound was in favour of neither supposition, since in either case the shot could not come from any distance, neither could the absence of this blackening of the hands be regarded as of any consequence after what we have already said (p. 284). In this very intricate state of matters, we gave it as our opinion, "That the dissection has not revealed any satisfactory data whereon to decide the doubtful question of murder or suicide, but the appearances found were not inconsistent with the idea of the case being one of self-murder." This case also was not proceeded with further.

Case CXXXVII.—Gun-shot wound of the Heart and Lung without a ball.

In this case the suicide (of a sick tender) was clearly made out. To conclude from the remarkable size of the wound, the man had probably loaded with water. The aperture of entrance—one of exit was wanting here too, where again no ball was used—was an inch and a-half beneath the left nipple; it was almost two inches long and one inch wide, and had lacerated edges, which were neither inverted nor everted. In its neighbourhood there were several ecchymosed patches, partly denuded of their epithelium, of a dirty brownish-red appearance, and soft to cut. Nothing unusual was found upon the hands. It was somewhat remarkable to find eight ribs (from the fourth to the eleventh inclusive, on the left side) shattered. In the left pleura there was a quart and a-half of very dark blood, in which floated small pieces of the substance of the heart and many coagula. The left lung was somewhat lacerated at its anterior border, and in the lacerated pericardium the heart lay completely shattered. In the bloody contents of the left half of the thorax there were also many splinters from the fractured ribs, and a plug of strong grey paper, but no ball. All the other organs were uninjured.

CASE CXXXVIII.—DOUBTFUL SUICIDE.—DEATH FROM STUFFING THE MOUTH WITH POWDER AND FIRING IT.—RUPTURE OF THE LUNGS, ŒSOPHAGUS, AND LEFT CAROTID ARTERY.

This is so extraordinary a case that it certainly deserves to be related here. It was that of a coachman, who died under such circumstances as to give rise to the suspicion of murder, although it was known that he had been killed by blowing up a quantity of powder with which his mouth had been stuffed. At both angles of the mouth of the corpse there were jagged and scorched rents, of which the right one was two inches long and one inch in width. The tongue was only bloody and hard to cut, but not, properly speaking, scorched. The palate was also uninjured. In the fauces there was an ounce of coagulated blood. The skull was perfectly uninjured, and the effects of the explosion of the powder were much more evident inferiorly. In both pleural cavities there were respectively two and four ounces of dark fluid blood, and the upper lobes of both lungs were perforated with many holes, and much broken up. The trachea and larynx were uninjured; on the contrary, the faucial extremity of the œsophagus was rent, and in its centre there was a rupture the size of a bean. Finally, the left carotid artery was found ruptured. We therefore gave it as our opinion (1.) that death had been caused by hæmorrhage from the aorta and from the pulmonary injuries, and (2.) that the supposition that death had been caused by a third party was not justified by the results of the dissection, but rather that the case was one of suicide. Very soon thereafter it was made plain that the suspicion of murder was perfectly unfounded.

CHAPTER III.

DEATH FROM BURNING.

§ 16. General and Diagnosis.

This kind of violent death, which we have reckoned amongst the mechanical deaths, for the reasons already stated, may kill in various ways. For instance, the man is either burned by the action of flame and heat, which kills by producing a more rapid and greater afflux of warmth than the organism can make use of, and which, therefore, kills by destroying the dermoid tissues. The resulting phenomena apparent on dissection are those of *inflammation*, particularly of all the serous membranes; *effusions* being usually present, or of *asphyxia* (§ 39, &c.) with inflammatory injection of the mucous membrane of the trachea, hyperæmia of the lungs, of the right side of the heart, and of the larger blood-vessels; or in other cases, particularly those of peculiarly sensitive individuals (children), who die rapidly in great pain and convulsions, the death ensues from *neuro-paralysis*, and the appearances found are entirely negative. When Rokitansky* states that hæmorrhagic erosions of the mucous membrane of the stomach, as well as the acute perforating ulcer, are "frequently observed" after death by burning, we cannot, with such a voucher, doubt the fact of their occurrence; at the same time, in regard to their "frequency," I must state that I have never observed these phenomena in a single case of death from burning. The body is burned either by flame, or by heat united to some solid body, as hot or glowing metal, incandescent coal, &c., or with fluids, as water, coffee, oil, &c. Or the body is "burned," as it is figuratively termed, by caustics, which also destroy the dermoid tissues, such as mineral acids and caustic leys, solid caustics, rubefacients, cantharides, mustard, &c.†

* Wochenblatt der Zeitschr. der Gesellsch. der Aertze zu Wien, 1856, No. 23, s. 366 u. 368.

† Men who perish amid a conflagration, may also die from other causes. They may be struck dead by falling beams or walls, &c., or be suffocated in

In determining the fact of death from burning we are met at the outset by the difficulty, that it is almost impossible to determine with accuracy how large a portion of a surface of the body must be burned in order to make death inevitable. Every physician knows that burns involving the half or a third part of the entire body must be regarded as necessarily fatal. Is, however, the same opinion good should only a fourth or an eighth part of the body be burned? And how difficult would it not be to determine the fractional amount of the burn, where, as is so often the case, it is not continuous, but involves sundry patches upon one arm, others on the back, and others on the leg. In such cases, there is the widest scope afforded for individual estimation; but a rational consideration of the individual case will serve to limit this.

A burn comprising the very same amount of square inches may cause only temporary inconvenience to a robust workman, while it may prove irreparably fatal to a feeble and sensitive woman. Irritable little children die from burns which comprise but a trifling fractional amount of the surface of their body. Therefore, because a purely geometrical calculation of the surface of a burn is of no use in estimating its severity, it is also quite erroneous to suppose, as I have seen done, that a number of isolated patches of burning scattered over the body, each of so unimportant a size as that they collectively amount to but a trifling fraction of the entire surface, must have been productive of no injury to life. This is just as erroneous as to estimate the effects of several hundred needle-pricks, by stating that, taken collectively, they constituted but an unimportant wound, scarcely the size of a cherry! The irritation of the cuticular nerves by so many isolated burnt patches, both can and does cause very much more pain and vascular reaction than a continuous burn of larger size; and this is nowise lessened by the greater difficulty of making the appliances necessary for promoting the healing action in the case first mentioned.

But the present praiseworthy condition of the penal code provides that too much importance be not attached to individual opinions, practically, since, as is well known, the law no longer takes any cognizance of *necessarily*, or individually mortal injuries, &c. (§ 185, Penal Code), and the medical jurist is required to decide each

the smoke. In such cases, however, the death is due to injury or asphyxia, and not to combustion, which in these cases rather happens after the death than before it.

case on its own footing. Should burns be found upon a body, and death have followed their infliction, while the dissection has revealed no other cause of death, then the burns *are to be regarded as its efficient cause.* It will frequently happen that the medical inspectors at the time of the dissection are not in a position to give such a decided opinion, because at this time they are ignorant of all the antecedents of the case, a knowledge of which is requisite, unless where the burns are very extensive; in such a case it is requisite so to word the summary opinion at the end of the protocol of the inspection as to reserve the power of giving a more decided opinion when a more accurate knowledge of the case is acquired, either by the communication of the documentary evidence, or by the examination of witnesses at the time of the public trial.

The diagnosis of combustion on the body is in general by no means difficult. The opposite assertion displays a complete misapprehension of the practical end in view. Thus, it is very far from difficult, though it is generally thought so, to determine whether a body, so completely destroyed as to be no longer recognisable, has been burned before or after death. *Such* a burning is, of course, always after death, since a living body neither roasts nor chars! But if it be said that it is difficult to decide whether the person burnt may not have died from some other cause,—such as strangulation, suffocation, &c.—and been afterwards burnt to conceal the deed, then this is perfectly correct. But *this* difficulty concerns not combustion alone, but every possible mode of destroying and disfiguring the body after death, such as putrefaction itself, &c. As to the fancied difficulty, however, of deciding as to whether blisters from burns have been produced before or after death, I shall presently point out that even in this case the decision can never falter. In general, burns display themselves on the body in a twofold form. Either the form of the whole body, or of its individual burnt parts, is completely preserved, or it is not. In the first case, according to the degree of burning during life, the burnt part is recognised by a (crab-) red, or by a brownish coppery-red coloration, and a dry, parchment-like condition. This hardness and the bright colour prevent any confounding of these marks with post-mortem stains. In certain rare cases, frightful to behold, the entire body may exhibit the appearance described—as, for instance, when the unfortunate individual has been actually roasted (Case CXLIV). Or we find blisters, vesicular elevations of the cuticle, of various sizes, or burst

vesications,—excoriations of the cuticle. In every case we must be careful not to confound this appearance with that which seems at first sight very much to resemble it, viz. the bullæ arising from putrefaction; and we must be more particularly careful in those cases in which both appearances exist simultaneously in the same body, as our want of due attention to this matter inevitably leads to an erroneous appreciation of the extent of the burn, with all the important influences on the medical opinion therein involved. Every vesication produced by burning has a purple-red boundary line, be it ever so narrow, perfectly visible to the naked eye, and also a more or less red base; the phlyctænæ of putrefaction have neither of these peculiarities. Every excoriation produced by a burn exhibits this reddened basis, frequently beset with granulations already visible, though minute, and yielding pus; these are, of course, both absent in excoriations, the result of putrefaction, in which the colour of the exposed true skin differs in no respect from that in its immediate neighbourhood, that is, it is either colourless or more generally green. Of course, in perfectly recent bodies, that display none of the usual signs of putrefaction, we need never think of looking for this phenomenon of advanced putrescence.

In the second case, where the form of certain parts or of the entire body is destroyed by the combustion, the parts are so carbonized that when the whole body is affected the human form itself is scarcely recognisable, or the external coverings of the cavities may be charred, so that it is nothing uncommon to be able to see through the openings in the charred and shrivelled coverings of the abdomen or thorax, right into their cavities, and to be able thus to inspect the roasted or carbonized internal organs.

Solid and fluid caustics of every kind produce reddish-brown, or (particularly that most common of all corrosives, *sulphuric acid*) dirty-brown, and *nitric acid*, yellow patches or stripes, which cut leathery, the incision affording no indication of ecchymosis, and beneath which the true skin is completely destroyed.

When cases occur, as they sometimes do (Maschka, Buchner), in which there may be a doubt, whether the burn has been caused *by fire or by sulphuric acid?* then, besides the appearances already described, the following circumstance may also serve to assist the diagnosis: the individual circumstances of each case; the absence of vesication when the burn has been produced by sulphuric acid; the uniform colour and condition of all patches burnt by the acid; while in any con-

siderable burn from fire, the different effects of fire are to be found on the body near one another, blisters either existing or burst, roasted patches, &c.; further, traces of deposit of carbon (soot) on the skin, the result of burnt articles of clothing, or of the singeing of the hair upon the body, which is never produced by acids; and finally, the chemical testing of the articles of clothing burned for sulphuric acid (*Vid.* § 46, Gen. Div., p. 206, and § 34, under No. 2, Spec. Div.).

§ 17. Experiments on the Dead Body.—The production of vesication after death.

For the first time in the course of a medico-legal practice of many years' duration, the following question occurred to me in the important Case No. CXLII., to be afterwards detailed:—"Have the vesications found on the body of the woman (Hake) been produced subsequent to death or not?" I considered myself justified in answering the question negatively. This view was, however, combated in another professional opinion, in which the following doctrine was laid down, "that experience teaches, that vesications can be produced even in the dead body within from twelve to twenty hours after death, or even after the lapse of longer time, by the persistent action of fire, very probably by the rapid expansion into steam of fluids which cannot escape through the cuticle, and that these vesications resemble those produced during life all the more perfectly the shorter the period that has elapsed between the death and their production." The best practitioners are opposed to this view. Orfila says (*Med. Leg.*, I., Paris, 1828, p. 457, "*it has been attempted to discover whether there are any vesications* (without further description of their circumference or basis), *which are capable of truly denoting whether a child was alive when burned or no.*" Devergie (*Med. Leg.*, Paris, 1836, p. 273) remarks:—"*If boiling water or a piece of red-hot iron be applied to the surface of a body even ten minutes after the death; neither redness nor vesication is produced;*" and shortly after he says, "that it is not possible to mistake a burn that has occurred during life, for one inflicted after death." Christison (*Edin. Med. and Surg. Journal*, April, 1831), has made six experiments, "whereby it appears evident to him that the application of heat even a few minutes after death is incapable of producing any of the effects due to living reaction." That case is particularly instructive in which an individual lying

comatose had boiling water applied to him four hours before his death, and was burnt with a hot iron *half-an-hour after*, whereupon large blisters formed in the one case, and *none at all* in the other. In spite of these experiments, &c., I did not feel perfectly satisfied, and therefore, with the assistance of a friend, I instituted four experiments on the dead body, the results of which were shortly the following:—

(1.) We bound four times round the calf the leg of an old woman, aged 60, who had been dead forty-eight hours, a strip of wadding dipped in spirits of turpentine two fingers broad, and set fire to it (in the living body this gives rise to most extensive vesication). The wadding burned for four minutes, and was then entirely consumed. The strip of skin beneath it was slightly and superficially roasted; *but there was no trace of watery exudation or of vesication.*

(2.) On the same body the flame of an oil lamp was so applied to the top of the foot, that its entire breadth was in contact with the skin. The result was, that that part of the skin became brown, dry, and hard; but there was no trace of separation, swelling, or vesication to be seen.

(3.) Two experiments were made upon a premature child, which had lived for twenty-four hours. Thirteen hours after its death, a dossil of cotton-wool one square inch in size was dipped in turpentine, laid on the stomach and set fire to. After three minutes and a-half it was consumed. The spot was surrounded by fine radiating folds. Within three minutes a few small rents were found in the circumference, whilst the spot itself, which had been covered by the cotton, presented a light-brown, dry, toasted, crust-like appearance, *without a trace of vesication.*

(4.) Upon the distended dropsical scrotum of this body,—upon which, from its richness in moisture—according to the theory broached in the opinion given above—vesication ought to have been most easily produced,—a flame was so held that the base of its cone touched the skin. A moderate but constant action of heat upon the skin was thereby produced, without the possibility of any soot being deposited. The part exposed to the flame contracted, and assumed a silvery grey glistening surface; but *nowhere* did it exhibit the slightest *trace of vesication.*—If it should be objected to the first and third of these experiments that the covering of the skin may have obscured their results, this would be in effect completely to ignore the practical results of these experiments, for no one can deny that *precisely such a burn*

as was here produced on a dead body, would, on *a living one* have been followed by the most evident and unmistakeable results!

I have not, however, contented myself with these early experiments; but, particularly of late, I have continued to make, in concert with my students, many experiments on the production of burns on dead bodies every academical session, and that, too, on individuals of every different age and sex, and who have died from every possible variety of cause; and these have increased to such a number, and have been so uniform in their results, that it would be extremely tiresome and perfectly superfluous to relate them individually. The experiments have been made with various substances; we have wrapped round various parts of the bodies dry cotton, or cotton dipped in highly inflammable liquids, and set them on fire; we have poured boiling water or boiling wax over the body; we have allowed the point of the cone of the flame of a Berzelian lamp,* and this produces by far the most intense action of fire, to play upon the *tournure* of certain parts of the body, as the vault of the thorax, the thighs, arms, &c. By very many such experiments I have convinced myself, and all eye-witnesses, that it is an unquestionable truth—(1.) *That no reaction ensues when the dead body is covered flatly with substances that burn and have burned to charcoal,* such as folds of linen or layers of cotton-wool; at the most, but a few small burnt-looking patches are seen upon the spot, and a closer inspection shows that these are only smutty particles from the substance burnt. Of course any hair that may be growing upon the portion of skin experimented on burns, and may give the place a superficially roasted appearance. (2.) By means of the exceedingly intensive action of flame described above, *vesications can be produced upon the dead body,* though not by any means in every instance. The very great degree of heat produces a rapid evaporation of the fluids. These elevate the cuticle in vesicles of various but always small sizes. But the expansion of the vapour within these vesicles bursts them, and in a few seconds they explode with a slight crack, and the cuticle collapses. Only in a very few instances did these bullæ maintain their existence for a few minutes before they burst. Their formation is not accompanied by *any change* of colour in the basis from which they spring (*Vid.* the representation, Plate II., Fig. 3, *a, b, c*). Moreover, such bullæ never contain serum, but only a watery vapour, and they *never* exhibit any trace of the bounding line of redness, nor any trace of colour on their basis. (3.) It makes no difference whether the experi-

* An argand spirit-lamp.—TRANSL.

ment be performed immediately or not till several days after death. I may mention that the bodies experimented on by us were often left for days exposed to the air and to continuous observation, but any alteration of the burned parts by the action of the atmosphere was never observed. The following remarkable experiment, performed by ignorant men, which came under our observation three days after its performance, was very instructive in this respect, as well as in relation to the general question. A barrel-organ player, with his two children, had leaped into the water; they were all three taken out *immediately;* the two children alive, but the father dead. In order, if possible, to recall the deceased to life, the by-standers had rubbed him in the roughest manner, as was shown by the cuticular abrasions on the chest and groins, and had, finally, kindled a fire of straw beneath the body! The thighs and legs were mostly of a greyish-black hue from adhering soot, and the same was the case with the back and right arm; also in about ten or twelve different places, there were burst bullæ, just as I have described them, of various sizes up to that of a walnut; and there was no alteration in colour either of the exposed true skin of the parts excoriated, or of the base of these vesications. The conclusion deducible from all this is, that in by far the largest number of cases, we would just as little expect to find *persistent* vesications as the result of a post-mortem burn, as we would expect to find a burn of the body to result from that unintentional experiment daily repeated, the dropping of burning sealing-wax upon the pit of the stomach of those just dead to see if they be really so—a result which I have not yet observed once amid a countless number of such experiments which have come under my cognizance. When, therefore, vesications that may exist are examined with a due regard to the points of diagnostic value, the conviction is sure to be attained, THAT IT IS QUITE IMPOSSIBLE TO CONFOUND A BURN INFLICTED DURING LIFE, WITH ONE INFLICTED AFTER DEATH. I have nothing more to say respecting the roasting and carbonizing of the body, inasmuch as the individual must have been already dead before the action of the fire could produce so great an amount of injury.

§ 18. WHO IS TO BLAME, THE PERSON HIMSELF OR ANOTHER? SPONTANEOUS COMBUSTION.

The question as to whether a person found burned has met with his death from his own fault or that of another? can only signify,

has the unfortunate individual perished by accident, or been burned by a third party? for intentional suicide by combustion has never yet been known to occur in sane persons, unless, perhaps, among the Hindoo widows. The chief criterion in deciding this point is to be found in the appearances on dissection, when they distinctly reveal some other cause of death, such as fatal cranial injuries, wounds of the throat, strangulation, &c. But the answer to this question may become difficult or impossible, even should the circumstances of the case render it possible or probable that such a primary cause of death had existed, where the body has been so destroyed by burning, as to obliterate every trace of any such mode of death. A proper estimation of all the details of each case affords the only means of correctly deciding it, and for this, no general rules can be given.* If the deceased has been a workman employed about fire (a smith, &c.), and has been found burned to death in his workshop, it is much less likely to have been a case of murder than if a countess were found burned to death sitting before her secretaire in her boudoir.† And the same is true in the case of some poor old woman found half-burned sticking in the mouth of her stove,‡ and some lone-living rich old miser, whose boxes and coffers lie empty and tumbled about the room in which the burned body lies. Here, alas! it is too true, as Devergie says, that in ninety hundred cases of doubtful murder or suicide, the truth is to be determined less by science than by probative circumstances which lie beyond its pale.

But might not the deceased, even should murder be, from the circumstances, a probable supposition, yet have perished from *spontaneous combustion?* and was there not a judicial murder perpetrated on two innocent men in England, whose wives, according to the testimony of the "experts," had perished by spontaneous combustion, but who were executed, because an inexperienced jury declared them guilty of murder? It is sad to think, that in an earnest scientific work, in the year of grace 1861, we must still treat of the fable of "spontaneous combustion," a thing that no one has ever seen or examined, the very proofs of whose existence rest upon the testimony of perfectly untrustworthy non-professionals, upon newspaper para-

* Compare § 9, p. 263, and § 14, p. 281.

† On the cause of the death of the Countess von Görlitz, who was found half burned. Von Graff, Erlangen, 1850.

‡ *Vid.* our most interesting case in the Viertljscht. för gerichtl. u. öffentlich. Medizin. V. S. 1 u. f.

graphs, all of which in their statements laugh to scorn every known physical law. Every truly experienced medical jurist, who thoroughly knows the criminal world, and all the lies, frauds and dissimulations by which crimes committed are sought to be concealed, must regard the hypothesis of spontaneous combustion as one of the silliest of fables. Liebig has, from a scientific point of view, distinctly shown the untenableness of any such hypothesis;* and yet the most recent handbooks of medical jurisprudence do not hesitate to teach the possibility of the spontaneous combustion of the human body, which, to quote only one of Liebig's facts, contains only 75 per cent. of water, and is nevertheless, supposed capable of burning away to a handful of ashes in a very short time! For a full account of the arguments against this hypothesis, so important in regard to the ends of justice, I beg to refer to Liebig's incontrovertible pamphlet; and I shall only now consider those points in relation to it which are most apt to strike a practical medical jurist, or any other healthy human mind. Whoever has seen any bodies dragged from the rubbish of great conflagrations, has seen them, perfectly carbonized indeed, and it may be partially defective, but alway possessing at least so much of general human appearance as to enable them to be recognised. But never in such cases—never, even when the body has been exposed for days to fire or incandescent heat, has it been reduced to ashes!† And yet, in most of the so-called "proved" cases of spontaneous combustion, the whole process, even to the complete reduction to ashes, had occupied but a few hours at most! Further, if we are to investigate these "cases," we find in all of them, without exception, that the effects of the fire upon the persons themselves, as well as on the combustible matters upon or around them, are so described as to throw despite upon what every child knows to be the truth as to the burning of the latter, and what every physician knows as to the burning of the living body. The old drunkard was burnt, but the stool on which her charred remains were found sitting was uninjured; in other cases, the legs or head have been burned, but not the stockings or

* Zur Beurtheilung der Selbstverbrennungen der menschlichen Körpers, 2 Aufl., Heidelberg, 1850.—(Giving in a few pages a perfect pattern of scientific criticism.)

† Except in the rarest instances—in the case of Mr. Scott, destroyed during the late (June-July, 1861) great fire in London—only two or three bones, with a gold watch and guard, marked the spot where his body had been, but it had been exposed to incandescent heat for nearly a fortnight!—TRANSL.

the nightcap! A Mr. D. was playing with sulphur, which he set fire to at a light; he burnt his fingers and clothes, but extinguished the flames. By-and-by, his fingers began to burn "like candles with a bluish flame" (!!); and with these "candles" he ran to a doctor (!!), &c.—for the fingers began again to burn. "They were bandaged up, as in a case of simple burn, and twenty-two days afterwards the sick man was in a satisfactory condition," for large vesications had now formed.* And just because these extraordinary details exclude the action of every physical law, some yet believe it necessary to have recourse to still more wonderful hypotheses to explain them, without confessing that that can be true to which modern science is opposed, since that would be to admit every superstition or fable into the realms of science. All is not true that is printed, and nothing less true than spontaneous combustion, which in no respect can stand against adverse criticism. For without mentioning, that amongst the thirty so-called attested cases, in which, instead of an individual who had been seen the previous evening alive and healthy, only a few burnt fragments or a handful of ashes were found in the morning; there may have been some in which murder had been actually committed, the traces of which were attempted to be obscured by the burning of the body (Case CXLII.), or, in which the body was wholly carried off under cover of this burning, which, in truth, cannot be proved—without mentioning, that even in our own day, and in enlightened Northern Germany, people have not hesitated to assume as "proven" a case of spontaneous combustion, in which a young sempstress (in Hamburg), when admitted to an Hospital, *related!* that her finger had commenced to burn of itself, and in which indeed—a burned finger was found (!!), the girl, for some reason or other, having obviously deceived and mystified the physicians. —We proceed to consider the following facts:—From the twenty-eight cases of spontaneous combustion collected by Jacobs,† we omit this Hamburg case, and also the two wives of the Englishmen who were executed, and in classifying the others according to the countries in which they occurred, we find that 20 happened in France, 2 in England, 1 in Italy, 1 in Germany, and 1 in America. Twenty cases

* Richond in den Archives de Médecine s. Devergie, Annales d'Hyg. publique, 1851, s. 386.

† *Vid.* Casper's Wochenschrift, 1841, s. 113, &c. The same cases are to be found quoted in every treatise, and also in the Encyclop. der Med., Wissensch., Bd. xxxi.

in France to one in Germany, whilst another remarkable disease (as in truth spontaneous combustion must be called), the cases of which are considered just as well "proven," and which are just as little able to withstand a scientific criticism, the now justly notorious "Pyromania," is almost exclusively confined to Germany, and almost never occurs in France. This, then, is a most remarkable circumstance, since pathological essences are not limited by geographical boundaries; and the cause must be sought elsewhere; and it is no less striking a fact, that by far the larger number of all the known cases of so-called spontaneous combustion have been handed down to us from the last or even earlier centuries, and that in the many hundreds of journals of modern times there is scarcely one recent case to be found. We are therefore led to seek for other reasons.

I may here mention, that in by far the largest number of cases, the unfortunate individuals are stated to have been old, indeed *very old* (from 50 to 90 years), given to the abuse of spirituous liquors, and that the accident has occurred during *winter*, by *night*, and in solitude. I may also mention, that in most of such cases there has been found in the room along with the spontaneously-consumed body, some substance, however apparently trifling, burning, or that had been alight, such as a tobacco-pipe, a candle, a lamp, and especially an open fire. In portraying such a scene, what can be more natural than to suppose the following sequence of events: some evening in winter, in a wine country, a drunken old man or woman comes home half frozen, proceeds to light a fire in his lone room, and in warming himself at it sets fire to his clothes, and is burnt? Or the drunken old man, stupid with wine and sleep, and mentally feeble from age, sets fire to his clothes, bed curtains, &c., either with a spark from his tobacco-pipe, or by going about carelessly with a lighted lamp or candle, and is himself consumed in the conflagration? Such an explanation is certainly more natural and more tenable, than any hypothesis of "an excess of phosphorized fat in the blood," of extraordinary electrical agencies, of the existence of phosphoretted hydrogen in the body, &c. And *such* cases of spontaneous combustion indeed occur everywhere and every winter, only they may well be more numerous in France than in Germany, because in France their beds have curtains, which as a rule they have not in Germany, because in France fire-places, and therefore open fires are in every room, and in Germany only closed-in stoves! Moreover, in our Fatherland for almost two hundred years we have possessed a regulated public body of medica

men, beneath whose cognizance all such cases must come, while France, and other countries, still want in part this benefit, and therefore the details of all the recorded cases of spontaneous combustion have been communicated by priests, barber-surgeons, and rustics. Moreover, it must be remembered, as an incontrovertible fact, that the mass of the French people are more credulous than the Germans, and this helps to explain why France has been the actual birthplace of "spontaneous combustion," of which it is to be hoped that we shall hear no more in relation to the science of Medical Jurisprudence.*

Case CXXXIX.—Attempt to burn a Body.

Although superfluous, it may not be uninteresting to relate a somewhat singular experiment which we have made in relation to the subject of spontaneous combustion. A five-months' fœtus, which had lain in spirits as an anatomical preparation for an unknown length of time, and whose tissues must therefore have been even more saturated with combustible matter than those of the most inveterate toper could ever become, was so exposed to the most intense flame of a small chemical glass and metal-smelting furnace, that the apex of the cone of flame was applied to the body. In a few minutes the skin commenced to burn, the flame was at once removed, and the body—instantaneously ceased to burn. This experiment was repeated ten or twelve times after each other, with always the same result; scarce had the flame approached when the body took fire, and it was scarcely removed when it as suddenly went out. All the ultimate result of our experiment was the few burnt patches upon which we had allowed the flame to play, by no means a "spontaneous combustion" of the perfectly alcoholized body.

§ 19. Illustrative Cases.

Case CXL.—Burning in a chimney.

A young chimney-sweep was exercising his vocation in a flue, when he was suffocated by the smoke from a fire in the kitchen,

* *Vide* Pelikan's profound and scientific treatise on the subject in his Beiträge zur Gerichtl. Medicin, u. s. w. Würzburg, 1858, s. 1 u. f, for a most judicious view of a recent case of spontaneous combustion, occurring in St. Petersburg, which fell to nought before the criticism of science.

which had been lighted by some one unaware of his presence. He remained for some time sticking in the heated flue, and was then extricated completely roasted! He was not carbonized, but his entire body, without the exception of a single patch, had exactly the appearance of those spots on a body upon which fly-blisters have been applied shortly before death, that is, the whole of the skin was of a coppery-red with isolated yellow patches, and cut like parchment. In many places the skin was fissured, and the molten fat had flowed out, and as it were varnished the surrounding parts. The body was only inspected.

Case CXLI.—Five Carbonized Individuals.

During a fire, the family of a tailor, consisting of the two parents and the three children, who occupied the garrets, met with a most fearful death. The bodies were extricated from the rubbish, but the general appearance alone denoted them to be human. Their respective pelves also permitted the distinguishing with probability which was the man, and which the woman. It was a most mournful sight to see the two large and the three smaller skeletons laid out in a gradually decreasing row. All the five were perfectly carbonized and black, all their cavities laid open, and not a trace of soft parts any longer visible. From almost every skeleton single parts—an arm, a hand, a whole extremity, or a foot, &c., were broken off and awanting.

Case CXLII.—Murder by Combustion or by Strangulation?

The following is the important case above alluded to:—On the afternoon of the 26th of April, 18—, the labourer Fritze visited a lone-living widow, named Hake, aged 70, confessedly for the purpose of obtaining money from her, and in case of refusal, murdering her.

She actually did refuse the loan, whereupon F., a large and strong man, struck her at once a blow upon the forehead, which knocked her down. She lay "quite still, without groaning, moaning, or calling for help." He then took up a paving stone the size of a fist, which he stated he had found in the room, and struck her a violent blow on the face with it, upon which, "after being convulsed for a short time she never stirred more." He declared that he did nothing else to the body of the woman Hake, neither strangled her, nor burned her, but only turned her round on her face on the floor, as he felt it unpleasant

to look her in the face. He now searched the cupboards, where he found a purse containing £150; he remained in the house till it was dark, when he lighted a tallow candle, and afterwards went off late in the evening with his booty, after placing the candle beneath a cane-chair, for which singular proceeding he could or would not give any explanation. On the following morning the small two-roomed house of the widow Hake was found by sundry persons, amongst whom we ourselves were, filled with a strong smell of burning, and the walls, furniture, &c., covered with soot. In the bedroom the body, which will be described immediately, lay upon its face near the bed, which was quite destroyed, many parts of it were completely burnt, upon it lay a pillow quite burned, and one foot from it stood a cane-chair quite burned through, beneath which stood a brass candlestick, in the socket of which a tallow candle had burned out. In the sitting-room the paving-stone was found lying on the floor. The most remarkable appearances found upon dissection were the following, which I extract from the very full protocol written out at the time of the dissection:— The hair, covering the corpulent body, was burnt and partly carbonized, the nasal bones were broken, the bones of the *septum narium* separated from the cartilage; the eyes were firmly closed, and inside the right eye there were small vesications; the whole of the forehead was covered with clotted blood, and in the centre of it there was an ecchymosis the size of a halfpenny, on incising which fluid blood escaped; there was a smaller ecchymosis on the right cheek; the whole face was covered with dried blood and burnt feathers, was charred and almost unrecognisable; the right ear was quite charred, the left only burnt; at the root of the nose there was a semicircular wound a quarter of an inch long, and two lines broad, with blunt irregular edges, and at the distance of half-an-inch there was another similar but triangular wound; the tongue protruded from between the teeth; the neck was charred all round, and great patches of the skin cracked, the laryngeal region alone was not charred, but beset with several vesications; the right hand was completely charred; the right arm and forearm, as well as the left arm, were only partially charred, but were covered with numerous vesications, both large and small, which were partly filled with *serum*, partly empty, and this was also the case with all the numerous vesicles found scattered over the body. It was certainly remarkable to find the *nates* and external parts of generation completely charred, so that on the latter no anatomical structure could be any longer recognised. The legs and feet

alone were quite uninjured. At the internal inspection the cranial cavity and the brain were quite anæmic, and there was nothing else discovered at all relevant to the cause of death, wherefore we omit the other appearances found. The fracture of the nasal bones could now be distinctly made out to have been caused during life by the ecchymoses which extended into the bones. The mucous membrane of the trachea, when a deposit of soot had been washed off with a sponge, exhibited "a bright cherry-red colour, and some bloody froth was found in the trachea." The lungs were "greatly distended with dark blood;" the œsophagus was empty and normal; the large thoracic veins were distended with dark blood. Of the abdominal cavity, I need only remark, that all its organs were healthy, and the vena cava contained much dark-coloured fluid blood.

In accordance with these appearances we gave it as our provisional opinion, at the termination of the dissection, that the deceased had died from asphyxia, and that "it was quite possible" that the very considerable fire which had occurred had been the sole cause of this asphyxia. When our reasoned report was demanded, the following questions were given us to answer:—

(1.) Is it certain, probable, or possible, that the death of the woman Hake from asphyxia, could have been, mediately or immediately, produced by the blows which she received on the forehead and nose from the stone and the man's fist; or is it impossible that these blows could have produced this death from asphyxia?

(2.) If such should be the case, has this asphyxia been produced by the circumstance that Fritze, after knocking down the woman Hake, who was old and corpulent, laid her on her belly, and so left her lying without perceiving any sign of life up to the period of his taking his departure?

(3.) What medical reasons can be given for supposing that the smoke of the fire alone has produced death by asphyxia in the woman Hake?

As the death happened after the receipt of injuries, according to the then requirements of the law, we had to commence our report by a correct estimation of these in relation to § 169 of the *Code of Criminal Procedure* (that is, according to their degree of lethality). Since, however, even allowing that these injuries had produced an immediate concussion of the brain, the dissection had revealed that they had not been the cause of death, but that it had been produced by asphyxia, we were obliged to come to the conclusion that the three

lethality questions had no application to the present case. After we had explained scientifically the reasons why death was in this case assumed to have been caused by asphyxia, all the different possible modes of origin of this death were given. We then continued in regard to the first of the questions put to us—"in particular, asphyxia cannot be produced by cranial injuries which are neither severe nor fatal, which have not destroyed the whole brain or any large and important part of it, thereby interfering with the innervation of the lungs. In the present case, indeed, we must not altogether disregard the bruising of the nose, inasmuch as such an injury must interfere more or less with the act of respiration. The far more important passage for the respiration, however, that through the mouth, is quite unaffected by any fracture, or even by complete squashing of the nose; therefore, so long as the chief respiratory passage remains patent, no amount of injury to the nose can produce asphyxia." Accordingly, we concluded, in reply to the first query: "that it was impossible that death by asphyxia could have been produced by the blows given." In respect to the second and more difficult question, the following was the substance of our remarks:—"We must repeat that the woman Hake did not die from the cranial injuries. She was, consequently, not yet dead, as Fritze supposed when he saw her lying senseless on the floor, but she only lay—if, indeed, any credit is to be attached to his statements—in that stunned condition which the injuries to her head were capable of producing, but still alive and breathing. When in the condition just described, Fritze is said to have turned her round, with her face to the floor, close to which it must have been pressed, from the flattened condition of the nose, and thereby undoubtedly the respiration must have been made more difficult. Especially when we consider that the woman Hake was already far advanced in years; that at her time of life the respiration is less frequent and energetic; and further, it is not contrary to the evidence to suppose that there coexisted a certain amount of concussion of the brain, which of itself would render the respiration slower and more laboured, so it is *not impossible* that all these various causes of respiratory embarrassment might ultimately so accumulate as to produce complete asphyxia. But this supposition, to which we do not accord any probability, to say nothing of certainty, leaves us completely in the dark as to the production of *the charring of the face*, which must be regarded as lying almost flat on the floor, and yet the floor itself beneath it was by no means badly burned or char-

red.* Also the fact of the *right* hand being completely charred seems to contradict this assumption; this may, indeed, have been so placed on the body already lying dead on the floor, as to have been specially exposed to the action of the flames, but of this we have no knowledge, while we cannot shut our eyes to the possibility that the woman Hake was yet alive when the fire seized her clothing, and the pillow which was found covering her back, and that, either fully conscious of the danger of her situation, or still half unconscious, she strove with all her might with her right hand to tear off the burning articles, and thus to save herself. In reply, therefore, to the second question, we can only say:—That the circumstance that Fritze, after knocking down the woman Hake, laid her on her face, and so left her lying for several hours, may *possibly* have produced the asphyxia from which she died." In reply to the third question, we thus expressed ourselves:—The great deposit of soot which we found on every article of furniture was sufficient proof of the density of the smoke, which had completely filled the two small rooms in the woman Hake's house. And this was further proved by the utterly consumed state of all the clothing on the body, by the complete carbonization of her face, right ear, right hand, *nates*, and external parts of generation, which distinctly showed how intense the fire had been, and how powerful had been its action. That such an amount of burning and of smoke must have killed any one lying helpless in its midst, requires no further proof; it is also self-evident that in such a case the dissection would reveal exactly the same appearances as were found in the body of the woman Hake, namely, burning and charring of the surface of the body, and the signs of death from asphyxia internally. That, however, the asphyxia in the case of the deceased was produced in this manner "*alone*," can be by no means proved by "medical reasons." On the contrary, there are in this case several other possible hypotheses. For instance, had Fritze, after knocking the woman Hake down, strangled her with his hands or with any instrument, and then so burned and roasted the neck as it was found by us, the mark of cord or ligature would thereby have been completely effaced, and the appearances on dissection would have been precisely the same as those found—and the result would have been precisely similar, had he forcibly held the pillow over the face, or the whole of the head of the woman as she lay on the ground, till he either knew

* A similar circumstance has been observed in many cases of so-called spontaneous combustion, and it is one of the many miraculous phenomena described in connection with them!

or supposed her to be dead, and thereafter set fire to it," &c. Accordingly, we replied to the third and last question by saying, "that there are no medical reasons for supposing that the woman Hake has been asphyxiated solely by the smoke of the fire which surrounded her."

Fritze was executed. As we have already remarked, it was psychologically remarkable that this man, though he became softened and repentant at a very early period of his imprisonment, and freely confessed the murder with all its details, could yet never be brought to acknowledge the fire-raising, of which he was also indubitably guilty. Just one day before his execution, when he had no longer anything to hope for or dread upon earth, I spoke to him in the prison, and asked him to tell me now, as a matter personally interesting to me from its connection with my branch of science, what he had done with the woman Hake. In vain! He held fast to his statement that he did not know why, on going away, he had placed the burning candle under the cane-chair, and quite close to the bed of the murdered woman! Forced by the gnawing of his conscience, he did not hesitate to confess that he had been a *murderer;* but he would not leave the world stigmatized as an *incendiary*. This is an illustration of the peculiar *point d'honneur* of a criminal, many proofs of which are to be found in the criminal world.

Case CXLIII.—Fatal Scald in a Bath.

A man aged 68, of weak intellect, was scalded to death in a hot bath in an Hospital. As the neglect of his attendant was presumed, a medico-legal examination was ordered. We found the half of the back and belly, the whole of the left forearm, the parts of generation, and the whole of the inferior extremities so burnt that the epithelium of all those parts lay in tatters over the brownish-red coloured *cutis vera*, and the nails of the fingers and toes were all awanting. The poor fellow had only lived two hours after the injury. From the appearances on dissection, we must deduct a gelatinous exudation on the surface of the brain, a very hard brain, a very large rust-coloured and friable liver, and a diffluent spleen, as all connected with the mental disease of the deceased, which had existed for one year and a-half, and we could only reckon great congestion of the brain, and distention of the right side of the heart, and particularly the condition of the blood, which was dark, almost black, and loosely coagulated—grumous—as due to the fatal scald. It is perfectly self-evident that a scald

which affected two-thirds of the body, and occasioned death in two hours, must be assumed to be absolutely fatal (according to the law as it then stood).

Case CXLIV.—A Roasted Man.

A man aged 83, sitting before a stove had his clothes accidentally set fire to; they were burned to ashes, and the feeble helpless old man was found sitting dead and roasted before the stove. The body was in a bent position, was completely carbonized, except the legs, which were burned of a deep dark brown, but not carbonized. The whole of the back was particularly destroyed, so that in attempting to straighten the body, it broke. On the right side the external coverings were so cracked that one could see through the fissures into the thorax and abdomen, in the latter of which the roasted right lobe of the liver could be distinctly recognised. Any further examination of the body was, of course, declared to be unnecessary.

Cases CXLV. and CXLVI.—Burning of two Children.

A boy, aged 6 years and three-quarters, and his sister, aged 3 years and a-half, were both destroyed in one fire, which their mother was supposed to have kindled intentionally, in the room in the crib in which the younger child was lying upon feathers and rags. The body of the youngest child everywhere displayed injuries arising from fire. The external surface of the left upper extremity, the parts of generation, the *nates*, and the toes of the right foot were black and carbonized; the left half of the face, and the left side of the body were roasted brown and leathery; and finally, the right upper extremity, the left hand, and both of the thighs, displayed the lesser degree of burning—separation of the cuticle. The body of the boy, on the other hand, presented no injuries from fire. Both of these children had died from asphyxia. Particularly remarkable was the fact of the tracheæ of both, being filled with not very frothy, dirty, dark-coloured mucus, in which black particles (soot) were distinctly visible. The lungs of both the children, particularly the right one, were very much distended with dark fluid blood, as were also, particularly in the case of the boy, the large venous trunks of the thorax and abdomen. The right side of the boy's heart contained half a tablespoonful of such blood, the right side of the girl's heart only half a teaspoonful. The

abdominal organs of the girl were not at all congested; in the boy, however, the liver and right kidney were hyperæmic. The stomachs of both were distended with a pultaceous mass of apples and potatoes. The urinary bladders of both were empty. The small intestines of the boy alone had a rosy-red (cholera-like) appearance, as is often the case in death from asphyxia; the large intestines of both were full of fæces. The whole surface of the brain of both children was of a peculiar rosy-red, and its substance in both was more congested than usual, but this was not, however, the case with the sinuses. I may mention by the way, that the thymus gland of the boy, almost seven years old, was still the size of a walnut; and that in these asphyxiated children the tongue was not found compressed between the teeth, but lying behind them (*vid.* Death from Asphyxia, § 394).

Case CXLVII.—Fatal Burn from hot metal.

This was a very peculiar case. A girl aged 2 years and a-half, had fallen with her buttocks and parts of generation upon a hot smoothing-iron, and after eleven days' illness died. Her private parts were from the *mons veneris* to the *coccyx* brownish red, leathery (roasted), and the vagina was greyish red, soft, and gangrenous. The uterus was not gangrenous, and internally the fluidity of the blood, and the bright-red colour of the mucous membrane of the trachea, in which there was also a little bloody froth, were the only things observed that were very remarkable; since, however, the child had lived eleven days, and as the lungs were also pale and anæmic, these appearances could not be regarded as the signs of death from asphyxia. In our summary opinion we therefore assumed that the child died from internal disease, which was indubitably connected with the injuries discovered, and we reserved any further reasoning upon the subject till the complete history of the case should be given us, from which to prepare our reasoned report; this, however, we were never required to furnish.

Case CXLVIII.—Fatal Scald from boiling coffee.

A girl, aged 6 years, while lying in bed was scalded with boiling coffee, and died in eight days. The scald extended visibly from the left ear over the half of the back into the right axilla, and down the right side of the thorax, and the right upper extremity. Its effects

were visible partly in brownish-yellow patches, which cut soft, partly in separation of the cuticle, partly in sores already granulating. Internally there was pleuritis on the right side; the right lung was covered with recent bands of adhesion, compressed and hepatized. The left lung was healthy. The pericardium was distended with serous effusion. The right side of the heart was quite filled with cherry-red half coagulated blood, the left side was empty; the whole of the rest of the body, with the exception of the large abdominal veins, was anæmic. Accordingly we gave it as our opinion that the child had died from thoracic inflammation, originating in the scald.

Case CXLIX.—Death from fire.

The clothes of a boy, aged one year and a-half, took fire, and he died two days after. Apoplectic congestion of the brain, evident inflammation of the trachea and red hepatization of the inferior lobe of the right lung were the appearances found on dissection. The frequent coexistence of inflammation of the air-passages after extensive burns, is as well known as it is easily explained by a reference to the physiological consent between the pulmonary and cuticular respiration.

Case CL.—Death from fire.

While a widow, aged 81, was warming herself at the stove, her clothes took fire, and the whole of her *nates*, inclusive of the *perinæum* and *vulvæ*, were burned. She was at once sent to an Hospital, where, after several days of suffering, she died. Of her illness we know nothing. At the dissection the parts mentioned were found covered with deep ulcerations, which were covered with healthy granulations, upon which lay a dressing of raw cotton. A cherry-red parchment-like band separated completely the burned from the healthy parts. The internal appearances were of comparatively little importance, since, except general anæmia, nothing was found that properly resulted from the burn, except inflammation (red hepatization) of the upper lobe of the left lung, whilst the other parts of both lungs were anæmic, and no trace of any exudation was to be found anywhere else, either in the cranium, or in the pleuræ, or in the pericardium.

Case CLI.—Death from fire.

This case is rendered interesting and worth relating from the fact, that in it the action of fire upon a living body and a dead one could be seen upon one and the same corpse. A drunken old washerwoman had laid herself down upon a bench near the fire in the washing-house, and had fallen asleep. While asleep she had fallen on the floor, and that in such a position that the fire had reached her, for she was found lying burnt to death upon the floor. The burn extended over the left side of the face, the left shoulder, breast, thigh, and half of the left leg. The left arm and hand were quite uninjured, while the right hand was burnt, and it was the only part of the right side of the body that was so, thereby affording proof that the deceased had been alive and sensible when she was seized by the flames, and that she had endeavoured to tear off her burning clothing. The left half of the face, inclusive of the ear and the left side of the neck, with the left shoulder and upper half of the left arm were carbonized. The carbonized parts were surrounded by a dirty purplish-red, dry, leathery margin from a quarter of an inch to two inches broad. A similar state of matters existed on the left thigh. On the trochanter there were two burst vesications with cinnabar-red bases, and not far from them a small vesicle, filled with bloody serum, depended from a bright rosy-red basis, round which no margin could be seen, situate as it was on a spot already half charred and wholly covered with soot. Besides these vesications which had been produced during life, there were upon the anterior surface of the leg three patches, each the size of half-a-crown, from which the cuticle was abraded, and which were conspicuous by their whiteness amid the sooty dinginess surrounding them. The deceased had evidently been dead when the flame seized these parts, and produced these speedily burst vesications (on the dead body). Death was caused by cardiac apoplexy (asphyxia). The whole of the right side of the heart (and the *vena cava inferior*) were gorged with remarkably dark-reddish fluid blood, in which greasy coagula floated. The other appearances were not remarkable. The lungs especially and the trachea were normal, and their vessels very slightly injected; the brain and cranial cavity were not hyperæmic, and in the whole of the abdomen there was not a single appearance worth relating, except the venous congestion already mentioned.

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